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Case Study of New Jersey Wetlands Trends and Factors Influencing Wetland Use

JACA Corp., Fort Washington, PA

Prepared for

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FINAL REPORT

A Case Study of New Jersey Wetlands Trends and Factors Influencing Wetland Use

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Congress of the United States
Washington, DC 20510

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EXECUTIVE SUMMARY

INTRODUCTION

This report is a case study of the management of wetlands in the State of New Jersey in recent years. The study identifies wetland trends, wetland use factors and institutional structures before and after Federal and state legislation aimed at preserving and protecting wetlands were passed. The objective is to indicate the effectiveness of present legislation, any overlaps or gaps in the programs, and any specific recommendations for change at the Federal level.

New Jersey was selected as a case study area for several reasons. It is in the middle of the East Coast "megalopolis" and its farthest reaches are within only two hours of New York City or Philadelphia. Especially within the last 30 years, its wetlands have been used extensively for development of all kinds. It was therefore of interest to determine if legislation had reduced the impact of such pressures on wetlands. Another advantage in selecting New Jersey is to determine if the two U.S. District Corps of Engineers offices which have jurisdiction over different parts of New Jersey differ in their policies and practices regarding wetlands management. Differences in the implementation of Federal laws and regulations by two Federal offices may be more clearly seen against a background of laws and regulations of a single State. New Jersey also has a wide variety of wetlands, including many with low flows over which the Corps of Engineers does not take jurisdiction. Lastly, two major land use zoning programs exist in New Jersey that have interesting and somewhat diverse effects on

wetlands usage. The two programs are the Pinelands Commission which covers one-fifth of the state and the Hackensack Meadowlands Development Commission which, although it covers a much smaller area, has a mandate to provide jobs, homes, and solid waste facilities for a large number of municipalities in the region, as well as to protect water resources. The State also has several very active State laws to protect albeit regional freshwater and tidal wetlands (the Coastal Areas Facility Review Act or CAFRA, and the Wetlands Act), as well as other State programs which are less effective in the protection of inland wetlands.

This report also focuses on three areas within the State to present a micro-scale view of wetlands conditions. The three areas are the two mentioned above, that is, the Pinelands and Hackensack Meadowlands, plus the Atlantic City area. The areas under the two Commissions were chosen because of their somewhat unique land use zoning authorities, and their objectives and responsibilities as they relate to wetlands. The Atlantic City area was chosen because of the developmental pressures that came with the advent of casino gambling in Atlantic City.

OBSERVATIONS AND CONCLUSIONS

With regard to wetland quantities, the amount of wetland losses has reduced significantly since the inception of wetland programs in the last 10 years. On a statewide basis, the saltwater wetland losses averaged approximately 3,200 acres per year between 1953 and 1973, and losses per year since then have reduced to approximately 50 acres per year. In the Pinelands area, losses have been drastically reduced since 1980 although precise numbers are

not available. In the Hackensack Meadowlands, the losses have reduced from about 175 acres per year between 1950 and 1970 to between 50 to 120 acres depending upon whose figures are used. Further expected losses at the rate of 120 acres per year will occur if the Meadowlands Master Zoning Plan is implemented as is.

Where there is little or no State control and the Federal government does not claim jurisdiction and developmental pressures are strong, the wetland losses continue. There is, however, no information on the extent of such losses in the more rural areas, especially in Northwest New Jersey.

In the regulated wetlands areas, economic factors have been handled in different ways in New Jersey. The economic pressures in the vast Pinelands area and their threat to water supply and resources were dealt with through the creation of the Pinelands Commission. In the Atlantic City area, what would have otherwise been economic pressures on wetlands are being dealt with by Federal, State and local regulations. In the Hackensack Meadowlands, economic pressures on wetlands in the form of nonwater-dependent uses are accommodated by the regional Hackensack Meadowlands Development Commission and, after some alterations, are also approved with conditions by the Corps of Engineers.

The most prevalent technological factor in the New Jersey wetlands are the advances made in open marsh management for mosquito control. Newer methods are less damaging to wetlands than previous methods.

Concerning social factors, the environmentalists in the local citizenry, plus the environmentalists in groups like the U.S. Fish & Wildlife Service and the American Litteral Society, hold strong views on the inadequacies and injustices of the institutional programs. The Corps of Engineers

feels it has a very controversial responsibility and the New York District Office feels that is has a bad image problem.

With regard to surface water quality in New Jersey's waterways and associated wetlands, it appears that conflicting forces are at work. Other Clean Water Act programs such as the effluent limitations guidelines and sewage treatment construction grants programs have helped improve water quality in coastal and inland water areas and have helped to reopen shellfishing areas and attract more fish and wildlife species. On the other hand, in some waterways such as the Delaware Estuary, increased sediment and associated contaminants from erosion and stormwater runoff have in various unquantified ways may have partially nullified gains by improved wastewater treatment. There are no data to indicate the efect of wetlands per se on water quality.

The regulatory programs that most significantly affect the wetlands of New Jersey are:

Section 404 of the Federal Clean Water Act (1972)
New Jersey Wetlands Act (1970)
Coastal Areas Facility Review Act (CAFRA) (1972)
Flood Hazards Area Control Act (1972)
Pinelands Commission (1979)
Hackensack Meadowlands Development Commission (HMDC) (1968)

The 404 program protects all kinds of wetlands throughout the State as long as they are above the 5 cfs limitation. This broad coverage of wetlands has been a very important tool available to environmental groups trying to protect major wetlands, since the program is often the only one available. Where State programs exist, the presence of the 404 program provides important back-up; developers are more reluctant to fight first the State and then the Federal programs and, in special cases where, for technical reasons, the

State reluctantly has to approve a project, it can do so knowing that the Federal program will deny the project.

Another contribution of the 404 program is that it applies essentially uniform policies throughout the State for protection of wetlands. There are not sharp regional, watershed, or local differences in wetlands policies. There is only one policy which receives different interpretations by the New York and Philadelphia Corps districts: the New York Corps is more restrictive than the Philadelphia Corps regarding the definintion of "adjacent" wetlands.

However, in New Jersey, the 5 cfs limitation is very significant and means that a large percentage of freshwater wetlands in the State are outside the jurisdiction of the 404 program. In addition to the 5 cfs limitation and the differences in interpretations of jurisdictions, the lack of a way for 404 to deal with cumulative impacts was frequently discussed during the interviews for this study. It is a problem for the program as a whole but particularly where Nationwide Permits are concerned. Other problems discussed were the almost total lack of surveillance of especially inland freshwater wetlands, the lack of a flow of information about illegal fills among various Federal agencies, and minimal or no follow-up on compensation or mitigation plans incorporated into permits.

If there was no 404 program, most tidal wetlands would be fully covered under the New Jersey Wetlands Act. Inland wetlands within the Pinelands would be protected as well as other specific areas set aside as bird sanctuaries. etc. And inland wetlands within the CAFRA area would be protected but only from major developments (over 25 housing units or 300 parking

spaces). Essentially no other inland wetlands would be protected except as a secondary result of floodplain permits.

The New Jersey Wetlands Act protects wetlands influenced by tides (both saline and freshwater wetlands) except those near New York City and in the Newark Bay. It covers all draining, excavation, or construction activities, but the types and extent of wetlands are strictly limited in the law to those areas which support designated species of wetland vegetation. In addition, its jurisdiction is limited to where those species were mapped in 1972; no newly created wetlands are covered. The Wetland Act program is also less generous than the 404 program in interpreting what a "preponderance of wetland vegetation" means.

The most obvious gap in the coverage of the State's Wetland Act is that no inland freshwater wetlands are covered. If the program were eliminated, all of its wetlands would be covered by the CAFRA program and by 404.

The CAFRA (Coastal Areas Facility Review Act) program covers wetlands of all types, size flows, and acreages, however, it is geographically limited to the New Jersey shore area and certain related inland areas. It is also limited in that it can only take jurisdiction where there are "major" developments (housing developments of more than 25 units, commercial and industrial development of more than 300 parking spaces, and extensions of municipal services by more than 1,200 feet). The overall CAFRA program is also structured around regional planning objectives incorporating a wide range of regional, state, and national policies and issues. Therefore, although wetlands are classified as "Special Areas" to receive the greatest protection, it is possible that even they are vulnerable to pressures including

those represented by shifts in public administrations. The policies governing wetlands also contain such language as where there is "no feasible alternative," language which is especially susceptible to interpretation and pressure from developers and their lawyers.

If this program were eliminated, tidal wetlands would continue to be protected by the States' Wetlands Act as well as by 404. The 404 program would be the only institution to protect the inland wetlands presently under CAFRA. except for a small area which is also under the jurisdiction of the Pinelands Commission.

The New Jersey Flood Hazards Control Act program deals with areas often containing wetlands, but their protection is not part of the law or the program's policies. Threfore it is only by the nature of specific circumstances and permits that wetlands involved are protected. However, even if the program were to specifically protect wetlands, the protection would be restricted to wetlands within a calculated 100-foot floodplain. Many wetlands extend well beyond it; these would not be protected. In addition, the program does not consider small watersheds and their wetlands, nor the cumulative impact of permitted activities within the floodplain.

In the absence of this program, there is the 404 program (with its 5 cfs limitation, and minimal surveillance of inland wetlands) and the geographically limited CARFRA, Pinelands, and Hackensack Meadowlands programs.

The Pinelands Commisison protects all wetlands under its geographical jursidiction and covers all activities. Since its principal shortcoming is a lack of thorough follow-though on permit conditions, it is currently trying to improve monitoring and surveillance by establishing communication channels with other State and Federal agencies.

In the absence of this program, 404 technically would protect the area's wetlands. However the 5 cfs limit of jurisdiction would effectively reduce 404's oversight of more than 70 percent of the wetlands in the Pinelands. There is a small area where the CAFRA prgram policies would apply. However there is more flexibility in interpreting policies under the CAFRA program. For example, the 300 foot buffer around a wetland which is required by the Pinelands Commssion is a flexible target for CAFRA.

The Hackensack Meadowlands Development Commission's concern for wetlands is embedded in its legal mandate to protect the delicate balance of nature. However the Commission is also mandated to provide jobs, homes, and extensive solid waste disposal facilities. So, although it has jurisdiction over all activities in all its wetlands, there is a significant development context for its decisions. Recent decisions which would adversely affect wetlands are being controlled by the 404 program. The 404 program would be the principal wetlands protection program left if the HMDC program were eliminated.

None of these programs has any way to deal with the long range cumulative impacts of their permit programs.

The role local government plays in wetland protection varies from one municipal boundary to another and therefore could not be evaluated thoroughly in this study.

It is very difficult to determine what the net effectiveness of the State program would be if the State had total wetlands authority. The CAFRA and Pinelands Commission programs are at least as stringent as the 404 program. However, the CAFRA program has never been administered without the

presence of the 404 program. Those involved in the CAFRA program are concerned that, since 1981, the public interest clause, rather than the environmental clauses, of the enabling legislation has been increasingly used as a factor in issuing permits. A similar cause for concern is the fact that the new governor of New Jersey has just appointed two new members to the Pinelands Commission to replace the two most vocal environmentalists. It is thus unclear whether CAFRA and the Pinelands Commission will be able to withstand pressure to moderate the environmental component of permit decisions.

RECOMMENDATIONS

- Wetland definitions need to be consistent among the Federal program for jurisdictional purposes, field mapping purposes, and for aerial mapping purposes. Training with respect to such definitions should be updated for long-time Federal employees working in wetlands programs who were taught different definitions.

- Regarding wetlands mapping, the distribution of wetland maps at the local levels would facilitate local municipality sensitivity to wetlands protection objectives and institutional programs. If properly marked, the maps would also settle Corps of Engineers jurisdictional questions in advance.

- Both Corps of Engineers Districts recommend public education programs aimed at developers, local municipal representatives and interested citizenry. Emphasis in the education would be placed

on the importance of wetlands (particularly freshwater), the identification of wetlands, the pertinent laws and the monitoring and reporting of potentially illegal activity.

- Wetland surveillance should be conducted more extensively, for at least a short period, to determine the extent of illegals so that a reliable surveillance program can be achieved. Overall improved surveillance would occur if the various state and federal programs were better coordinated. Greater surveillance would also reveal the effectiveness of and compliance with mitigation plans.

- Legislative changes should be considered that would give the Corps of Engineers more enforcement power, such as, citation power and administrative law judges.

- A separate study should be performed on the effectiveness of mitigation in order to give it the proper usage in permitting practices. The effectiveness of and compliance with mitigation/compensation seems uncertain enough to warrant greater understanding of its role in permits.

- Improved guidance should be given to Corps of Engineers permit writers for dealing with cumulative environmental impacts.

- Initial Corps review of permit applications should include soils, vegetation, average depth of the water table, historical (i.e., 10-15 year) flood heights, surface characteristics of the site

indicating the presence of water (massive roots exposed, serious gulleys), and the characteristics of immediately neighboring sites especially when the project sites' soil has been altered or removed.

- o The protection of wetlands should be tied by law not only to water quality but also to flood protection and water storage and other major values of wetlands. This would allow much stronger and more effective cases for the protection of wetlands by both programs and environmental groups.

LIMITATIONS OF THE STUDY AND STRUCTURE OF THE REPORT

The report is based on available literature and interviews; the size and timing of the contract was such that new research or extensive data gathering could not be performed. Nevertheless, an extensive amount of literature was available and substantial cooperation was obtained from the institutions involved to provide an adequate reporting base.

The quality of the data in this report is thought by the authors to be good but not excellent. One of the better sets of data is the total saltwater wetlands acreage, and the losses that occurred prior to 1973. The statewide wetland loss figure for the period since 1974 is accurate for permitted areas but it excludes the amount of illegal wetland fills for which no one has a good estimate. The Hackensack data is good although there are differences of opinion as to wetlands definitions. Data on freshwater wetlands is very limited and the data here represents educated estimates.

Another limitation was the inability to followup the claims and counterclaims by various groups, particularly those of environmentalists. Where criticisms were lodged against the Corps of Engineers, it was difficult to determine whether the criticisms were based on former practices of the Corps of Engineers which are now improved or based on current practices. Also, with respect to individual illustrations of what were perceived to be inequities or mistakes in the 404 program, it was difficult to determine whether the cases referred to were typical or not, and we were unable in many cases to get the other side of the story from the Corps of Engineers or the State of New Jersey. It was also hard to judge whether a complaint against a program was a complaint against a law which did not adequately protect wetlands or against the implementation of those elements of the law which could be used to protect wetlands. In tracking down some of the complaints, we discovered that some of them were grounded in jurisdictional limitations imposed by the law. We were not able to return to the original source to explore finer details.

We note that figures on the number of permit applications and denials can be misleading A Corps of Engineers office could have few denials but many applicants may have withdrawn or not pursued their applications when they saw significant modifications or potential denials on the horizon. In addition, the better the pre-application process works, the fewer actual applications are received. Therefore, the number of applications received may not nearly reflect the total number of people that were actively interested in using wetlands. The "denial" figures are also misleading. There are very few applications which receive outright denials with no further discussions.

For most, the "denial" process takes the form of informal discussions as the final shape of the permit is developed. And, as one CAFRA permit reviewer commented, "What is the difference between a denial and a conditional approval -- the permit is effectively denied unless the conditions are met."

Lastly, we were not able to verify all of the information given to us by program administrators as to whether or not their statements truly represented the way things worked.

This report/case study is structured as follows: Chapter 1 presents the trends in wetlands use on a statewide basis and then presents the trends for the three regional areas, i.e., Pinelands, Hackensack and Atlantic City. Chapter 2 discusses the economic, technological, and social factors that have influenced wetlands uses in the areas of study. Chapter 3 first discusses the implementation of Federal wetlands legislation in New Jersey and then discusses the implementation of the most relevant state programs that affect the wetlands of New Jersey. Chapter 4 evaluates the overall suitability of the Federal and state governments legislation in preserving and protecting wetlands. Chapter 5 contains recommendations.

Chapter 1

WETLAND TRENDS

A. WETLANDS THROUGHOUT NEW JERSEY

Nature and Distribution

Despite high population densities and intense competing pressures for development, New Jersey still has hundreds of thousands of wetland acres left. The specific acreage cannot be ascertained, but it is likely to amount to at least 500,000 acres. The State's wetlands, which include each of the three major types, i.e., marshes, swamps, and bogs, provide valuable habitat for fish and wildlife, support a number of unique species, and benefit society in other ways such as dampening flood peaks and improving water quality.

By far the majority of the remaining wetland acreage is located in the southern half of the State in the Coastal Plain (Figure 1). This area still has more than 400,000 acres of fresh- and saltwater wetlands. The tidal salt marshes, similar to other East Coast marshes, are dominated by saltmarsh cordgrass (Spartina alterniflora) interspersed with salt meadow grass and relatively few other species. Studies by ecologists have shown that, when measured by the production of plant material, New Jersey's salt marshes may yield somewhat more than those in New England, but less than in Georgia. They provide a nursery for bluefish, weakfish, flounder, and striped bass as well as shrimp and other forage. Oysters, hard clams, and

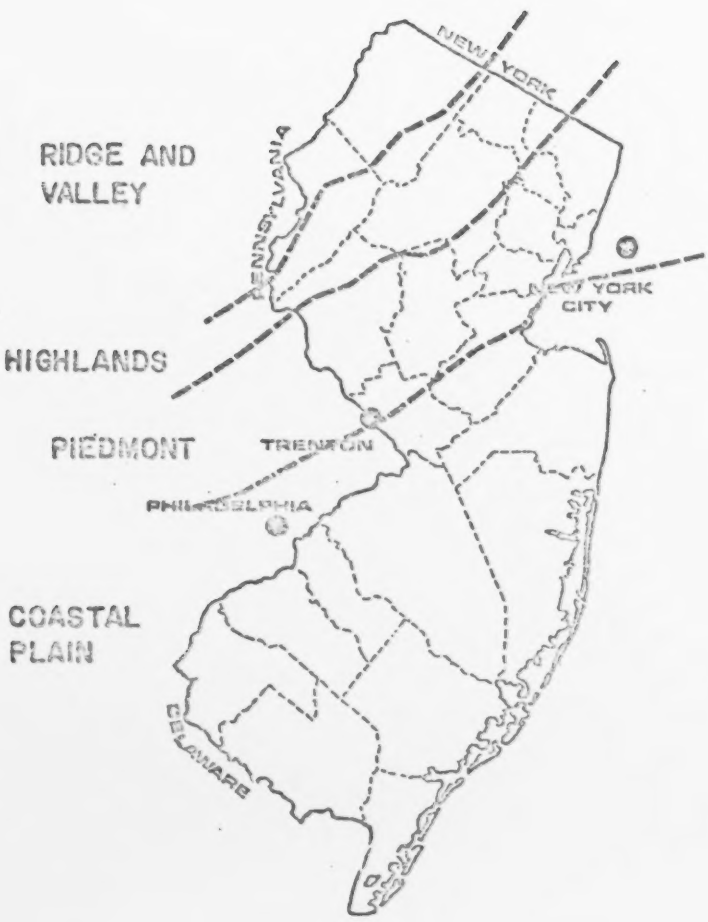

Figure 1

COASTAL PLAIN OF NEW JERSEY

blue crabs, important to the State's economy, thrive in wetlands and adjacent bay waters. From fall through spring, waterfowl are abundant and attract hunters from within and outside the State. Muskrat, mink, and raccoon account for much of the 3.7 to 4.9 million dollar trapping industry.

Inland, up major river systems such as the Mullica and Great Egg Harbor, Maurice and Cohansey, wetland ecosystems grade from brackish into freshwater. South Jersey's Pinelands, which are drained by these and other rivers, consist of 1.1 million acres (one-fifth of the State). Within this area there are about 260,000 acres of freshwater marshes, bogs, and swamps, although in many places there is no clear distinction between upland and wetland areas. What appears to be an upland pine forest from June through October is a swamp from November through May.

Wetland acreage in the North was never as extensive as in the South. The majority of wetlands in the North were formed as a result of the glaciers; examples include the Hackensack Meadows, the 4,275-acre Great Piece Meadow, and the Troy Meadows' 3,100 acres of cattail marsh and pin oak swamp. The latter is considered by some biologists to be one of the most productive inland wetlands in the eastern United States (Goodwin and Niering, 1971). Riverine marshes in north central New Jersey are dominated by soft-stem vegetation such as cattail, arrowhead, and pickerel weed.

In the mountainous portion of the northwestern part of the State, the Appalachian Highlands, there are a few bogs vegetated by spruce and larch which give the landscape more of a New England appearance than a mid-Atlantic one. Most of these bogs are the remains of "kettlehole" ponds formed by melting blocks of glacial ice. They, like bogs in South Jersey, are carpeted

by a dense spongy layer of Sphagnum moss, and support several species of sundews and other types of plants and animals adapted to acid water.

Swamps in the North also support red maple, birch, oak, alder, ash, and some white cedar.

Saltmarshes are very limited in northeastern New Jersey because of steep escarpments such as the Palisades along the Hudson River and because of extensive filling that has occurred around Newark and Elizabeth, eliminating or severly degrading former wetlands along the lower Rahway, Elizabeth and Raritan Rivers. The tradeoff is New Jersey's multibillion dollar petrochemical industry, other types of manufacturing facilities, and major port and air facilities.

Wetland Losses

Wetland losses are very difficult to tally, particularly for freshwater wetlands. For salt marshes, Robichaud and Buell (1973) estimated that of the 12,541 square miles of marsh that once existed along the entire eastern seaboard, 50 percent have been destroyed in the last two hundred years. In New Jersey, this percent probably has been equalled or exceeded; Ferrigno, et al (1973) found that in the 20-year period preceeding 1973, a total of 61,681 acres (23.4 percent) were lost (diked, filled, or developed) representing a rate of more than 3,000 acres per year. The results of this study are shown in Table 1.

Wetland losses were sharply reduced after 1972 when State and Federal wetland protection programs became effective. According to David Kinsey,

Table 1

TIDAL MARSH PARAMATERS, 1953-1973
(After Ferrigno, et al., 1973)

County	1953 Marsh Area (Acres)	1973 Marsh Area (Acres)	Marsh Area Lost (Acres)	Per-cent Loss
Atlantic Ocean Division:				
Bergen*	4,986	2,439	2,548	51
Hudson*	4,171	1,623	2,548	61
Union*	2,419	0	2,419	100
Essex*	613	0	613	100
Middlesex*	5,355	3,373	1,982	37
Monmouth*	3,810	2,021	1,789	47
Ocean*	37,008	26,079	10,929	30
Burlington*	7,361	7,218	143	2
Atlantic*	48,140	43,156	4,984	10
Cape May*	37,324	32,185	4,510	12
Delaware Bay - River Division:				
Cape May*	12,881	9,106	3,776	29
Cumberland	54,019	43,018	11,001	20
Salem	34,878	24,549	10,329	30
Gloucester	7,119	3,674	2,445	48
Camden	554	297	257	46
Burlington*	1,621	1,211	410	25
Mercer	796	796	0	0
Total	262,922	201,375	61,681	23

Source: Sugihera, et al., 1979

*The entire county is not included in this Division.

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former Director of the Division of Coastal Resources, only 417 acres of tidal wetlands have been lost since 1974. This figure, however, is misleading because of Kinsey's definition of wetlands. This definition was established by the New Jersey Wetlands Act which included as tidal wetlands only those areas containing essentially wetland grasses; therefore areas with other wetland vegetation are not included in Kinsey's statistics. Also not included are wetland losses in man-made waterways including residential lagoon systems, or losses in the Newark Bay and the Hackensack Meadowlands. Clearly, considerably more than 417 acres have been lost, although the Corps of Engineers, U.S. Fish and Wildlife Service and many others agree that the rate has been reduced significantly.

Inland, nontidal wetland losses have not been estimated accurately. There are several reasons for this. The boundaries of many wetlands are difficult for even professionals to delineate. Transitional wetland habitats such as pitch pine lowlands formerly were not recognized as wetlands by many. This type alone accounts for more than 100,000 of the 260,000 acres in the Pinelands area. Second, there is no statewide regulatory agency specifically mandated to protect freshwater wetlands; without such an agency, there has been no agency to inventory and keep track of losses.

Nonetheless, it can be said that thousands of acres of inland wetlands have been filled in for residential, commerical, or industrial purposes especially in the densely populated suburbs around New York City. At the present time, there are tremendous pressures for development in many northern New Jersey counties. These pressures were triggered by the development of interstate highway systems which link what were quite suburban and agricultural communities with downtown New York City and which form a second

ring road around New York City, about 35 miles to the west. The area extends westward along Interstate 80 to Interstate 287 where it turns southwest, and then east along Interstate 78 back to the heavily developed New York suburbs.

Much of this activity is occurring in the Central Passaic Basin. The lower Passaic Basin, which empties into the Newark Bay west of New York City, has already been developed and when this happened (between 1940 and 1975) 7,500 acres of wetlands were lost (Shaw, 1982). Troy Meadows, Great Piece, Little Piece, Hatfield Swamp are all seriously threatened by this new development, and each has been reduced in size by 20 to 50 percent. Many stretches of the highways appear to have been purposely routed through the swamps. Since this happened, towns such as Florham Park have zoned wetlands for industrial and commercial use to enhance their tax base.

Freshwater wetland losses in southern New Jersey, where the majority of acreage is located, are not great. Most of these wetlands are actively regulated either by the Pinelands Commission or CAFRA and the Corps of Engineers, as will be discussed below.

Activities Affecting Past Losses

As discussed above, residential, commercial and industrial development has accounted for much of the activity in former wetlands. Other uses of wetlands are discussed below.

Agriculture. Unlike some other states, it has not been a common practice to drain swamps and meadows in order to create land suitable for

cultivation. The Soil Conservation Service (SCS) has sponsored some channelization projects which affect wetlands, but these projects were not considered by the COE to have a significant impact on wetland acreage. This was confirmed by the USFWS (Edstrom, Kulp, personal communication).

According to New Jersey's SCS State Conservationist, SCS activities are mainly limited to erosion control rather than activities which could reduce wetland acreage. In the last three years, there has been only one flood control project (which is still in the EIS review process) and very few farm pond and drainage projects (Campbell, personal communication). The reason for this is that the U.S. Department of Agriculture (USDA) has refused cost-sharing and because of State and Federal environmental review requirements. The latter, evidently, have discouraged many drainage projects designed to restore idle cranberry bogs. These projects now need approval from the Pinelands Commission (Campbell, personal communication).

Certain types of agriculture, namely salt hay and cranberry production, are conducted on thousands of acres of wetlands. It is important to point out that in producing these crops, farmers manipulate water levels, but never to the extent that land under production cannot be returned to a relatively natural state. For example, in the early 1970's along Delaware Bay, salt hay was being harvested from 11,300 acres but currently only about 5,000 acres are in production (Ferrigno, personal communication). To harvest the hay, tidal salt marshes are first diked and then ditched to lower the water table. In doing so, much of the value of the land as fish and wildlife habitat is lost. However, as commercial salt hay lands fall into disuse, the State has been buying them and breaching the dikes so as to re-establish regular tidal flooding. To date, 4,057 acres of salt marsh have been re-

stored by the New Jersey Department of Fish, Game and Wildlife from the acres formerly farmed for salt hay (Ferrigno, personal communication).

Cranberry production is another example of wetland use for agriculture. Currently about 16 percent of the nation's cranberry crop comes from New Jersey bogs located mainly in the Pinelands. Cranberry growers construct dikes in swamps and bogs and manipulate water levels so that the plants are exposed during the growing season and then submerged in the fall (to facilitate harvesting) and during winter months (to prevent freezing). Modest amounts of fertilizer and pesticides are applied to enhance production. Clearly cranberry bogs are not in a "natural state;" on the other hand, the industry is seen as compatible with the Pinelands environmental policies (P. Marucci, personal communication).

Forestry. Forestry has been important in New Jersey since the eighteenth century when wood was used for making charcoal, heating furnaces, building ships, and many other purposes. The swamps of New Jersey, particularly cedar swamps, have been cut over many times. Virgin stands of swamp forests were gone by the mid-twentieth century and some areas had been cut over three or four times (Rubeshavel and Buil).

Statewide, at the present time, woodland acreage of all types is increasing, mainly because today's economy has reduced the demand for lumber, and pressures for additional agricultural land are also down. However as recently as 1972 there was an annual net loss of about 7,000 acres of forest (Pierson, personal communication). The figure for the amount of forested wetland acreage is not available. On the other hand, in some urbanizing

portions of north Jersey where local economic conditions favor development and where only the 404 Program is available to protect wetlands, swamp forests are being converted to other uses (Pierson, personal communication). The forests in the Pinelands are an exception because of the Pinelands policy for wetland protection.

Mining. Thousands of acres have been disturbed by sand and gravel mining in New Jersey but there are no figures for losses in wetlands. However, the acreage probably is not great and may very well be offset by gains from wetlands developing in old gravel pits.

Transportation. The construction and maintenance of highways, rail, and port facilities has resulted in the loss of thousands of acres of fresh and tidal wetlands. As previously stated, major interstate highways in north Jersey seem to have been routed through wetlands. Current policies of the Highway Department, however, are to avoid wetlands whenever possible.

Waterfront development along the Delaware River and Port Newark eliminated thousands of acres prior to State and Federal wetland regulation. Many facilities are constructed in former dredge spoil disposal sites used by the Corps of Engineers for channel maintenance. Quantitative losses for this purpose cannot be provided, however they are currently minimal owing to the policy of both Districts to avoid wetlands.

Waste Disposal. Prior to the mid-seventies, the practice of filling flood plains and wetlands with solid waste was widespread in New Jersey. In

some areas such as Hackensack, the landfilling continues on the areas filed prior to 1972 but in Hackensack and elsewhere losses now appear to be minor.

Physical Changes

As is true throughout the country, siltation and nutrient enrichment have "aged", or eutrophied, a number of estuaries and rivers and lake systems throughout New Jersey. Erosion is also active, especially in coastal wetlands. The combined length of shoreline along the Delaware Estuary and Atlantic Ocean is more than 250 miles. Much of the shoreline is unstable and shows evidence of fairly rapid rates of erosion. For example, along a three mile segment of Delaware Bay (Egg Island, Cumberland County), it appears that approximately 36 acres have been lost in a 20-year period; this translates into erosion of about 5 feet per year. The estimate is based on only a cursory inspection of the photo-revised USGS topographic map for this area; more detailed studies performed by the Corps of Engineers in the Delaware side of the river showed that erosion rates in vegetated wetlands ranged up to 8 feet per year (J. Bartholomayo, personal communication). Most losses occur during storms when waves and tidal currents cut into the banks; thus the losses are not accompanied by gains elsewhere.

Water Quality Changes

Urban and argicultural development have contributed nutrients, sediments, heavy metals and other toxic substances to New Jersey's inland and coastal waters. The extent of damage to individual waters and wetlands is

very variable and therefore it is difficult to make generalizations. However, the presence of heavy metals. low dissolved oxygen, and high nutrient loading due to lecchate from landfills has been documented in the Hackensack Meadowland area; detailed studies in Beach Haven West, a residential lagoon system in Ocean County, show that lagoons contain poor water quality and support smaller shell and fin fish communities than natural wetlands (Sugihara, et al., 1979) and in the Pinelands area, where many species require acid water conditions, studies by Durand and Zimmer (1980) and Betz Converse Murdoch (1979) show increased pH and nutrient levels downstream from many urban and agricultural areas.

Biological Changes

Degraded water quality, and loss of physical wetland habitat has contributed to a reduction in sport and commercial species such as shellfish as well as many other plants and animals which may be of little direct economic importance, but contribute to the richness of New Jersey wetlands.

Most interesting perhaps, are the unexpected changes to wetlands which have occurred as a result of man's manipulating or altering the environment in some way. Perhaps the best example of this is the snow goose problem developing in the salt marshes of Cumberland, Cape May and Atlantic County. The lack of gunning pressure afforded by sanctuaries and by rigid bag limits has resulted in a population explosion amongst snow geese. State Fish and Game studies have shown that in Atlantic County the snow goose flock that uses the Brigantine National Wildlife Refuge has grown from 200 birds in 1970 to more than 50,000 in 1982. Snow geese feed on the roots and tubers of salt

marsh vegetation and in doing so have destroyed more than 10,000 acres of vegetated wetlands. In Cumberland County, "eat outs" are primarily responsible for hundreds of ponds on Egg Island and a 500 acre barren near the mouth of the Maurice River (Ferrigno, personal communication). The destruction of wetlands has an adverse affect on other species which depend on salt marsh and grass for food and cover. Of particular concern is the black duck, because sometimes up to 60% of the U.S. population can be found at the Refuge.

Cutting swampland timber is another example of biological changs due to human alterations. Frequently when Atlantic White Cedar is harvested, other species which are less desirable from both an economic and aesthetic standpoint, replace the Cedar. New Jersey once had nearly 150,000 acres of White Cedar, but now there are only about 47,000 acres (Parce, personal communication).

B. THE PINELANDS

The New Jersey Pinelands region includes more than a million acres in South Jersey (Figure 2). The area is surprisingly undeveloped considering its proximity to the Philadelphia and New York metropolitan regions and it is recognized for its significance as a natural and recreational resource. Water is perhaps its most important resource: underlying sand and gravel deposits contain an estimated 18 trillion gallons of freshwater - enough to sustain withdrawals up to 315 million gallons per day. Wetlands are widespread and include about 25 percent of the area.

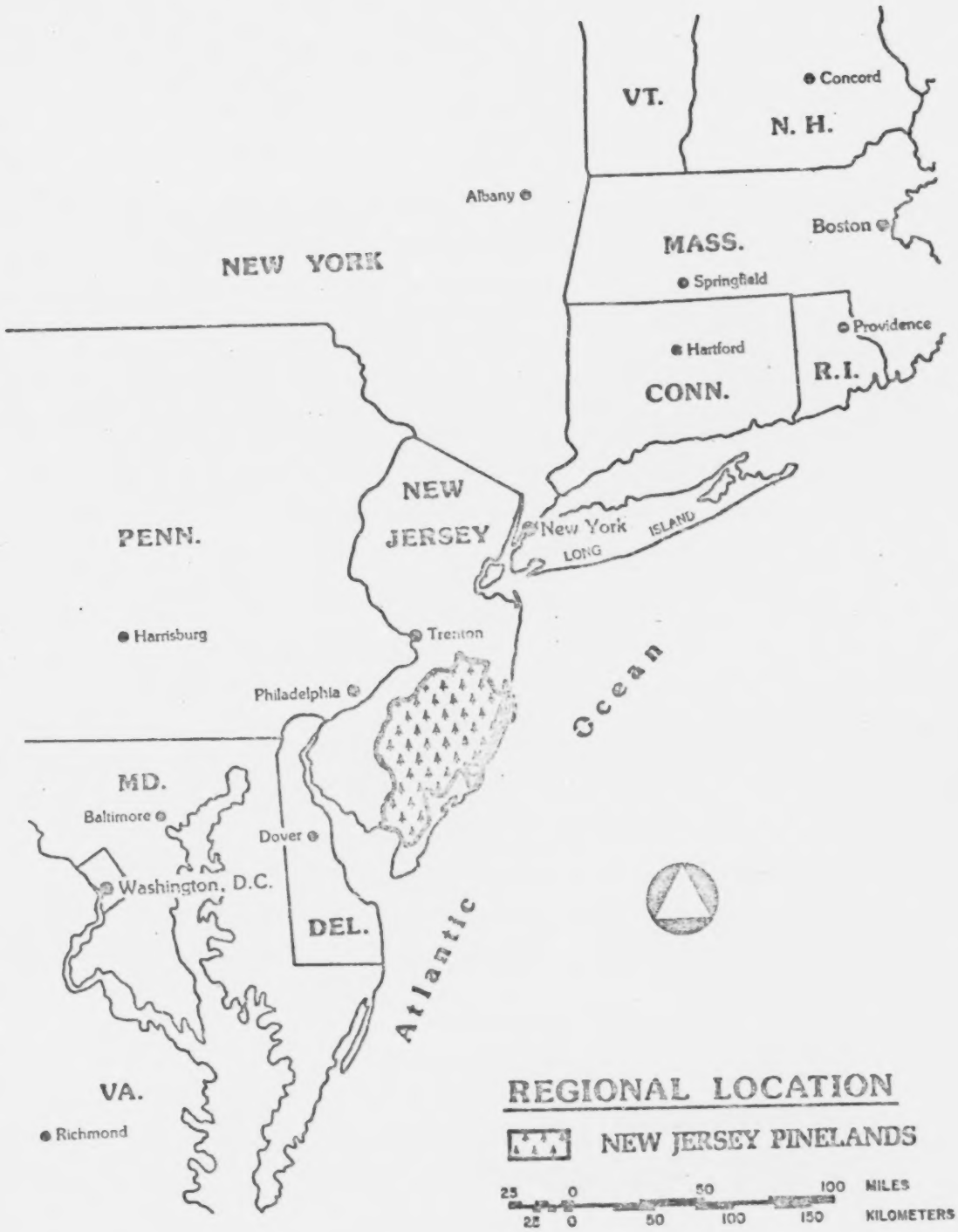

Figure 2

THE PINELANDS REGIONAL LOCATION

In recognition of the importance of the Pinelands resources and the fragility of the system, the State took on regional planning responsibilities manifested by the Comprehensive Management Plan which became effective in January 1981. The Plan was developed by the Pinelands Commission, a body established in 1979 charged with the responsibility for developing and implementing the Plan. Regulations contained in the Plan were designed to "promote orderly development of the Pinelands area so as to preserve and protect the significant and unique natural, ecological, agricultural, archaeological, historic, scenic, cultural, and recreational resources of the Pinelands area" (Pinelands Commission, 1980). Ostensibly, wetlands (the Pinelands) are protected by both Federal and State regulations, but owing to the 5 cubic feet per second (cfs) limitation, approximately 70-80 percent of the wetlands qualify for the nationwide General 404 Permit, and therefore in the Pinelands State regulations (namely the Pinelands Management Plan) have a much more significant effect.

Approximately 260,000 acres of the 1.1 million-acre Pinelands region is considered to be wetlands (by both the U.S. Fish and Wildlife Service and The Pinelands Commission). Freshwater wetlands in the Pinelands fall into three general categories: swamps, bogs and marshes. Swamps and bogs are much more widespread than marshes; one type of swamp, pitch pine lowlands, occupies 100,000 acres or 40 percent of all the freshwater wetlands. There are about 45,000 acres of Atlantic white cedar swamp and bog (Pierson, personal communication). The balance is mainly deciduous swamp (predominantly maple-gum), but wild rice and other marshes occur along the margin of major rivers such as the Mullica, Great Egg Harbor, Batsto, and Maurice.

Many of the shallow water impoundments and beaver ponds, common throughout the Pinelands, also support marsh communities.

Much of the water is still good quality, but it is easily contaminated owing to its chemical characteristics. The water is naturally acid (pH < 5.0) and typically tea-colored as a result of humates in the soil. Acid water and acid soils have favored the development of a relatively unique group of plants and animals. More than 800 species of plants, 250 species of birds, 91 species of buttterflies, 53 species of reptiles and amphibians, 24 species of fish and 38 species of mammals occur in the Pinelands. Some, such as the diminutive Pinebarrens tree frog and the curly grass fern, have very restricted ranges.

Wetland Losses. The Pinelands have had a long history of human use beginning some 10,000 years ago. However, in spite of the proximity of the Pinelands to major metropolitan areas, population densities remain very low, particularly in the Preservation Area (Fig. 3). Wetland losses due to filling cannot be estimated, first because they have never been quantified and second, because until recently transitional wetlands, those located between "true uplands" and "true wetlands", often were not recognized as wetlands by other than trained ecologists.

Wetland losses in the Pinelands may have amounted to as much as several thousand acres per year in the 1960's and 1970's. However, beginning in 1979 when a two-year moratorium on development was imposed in the Pinelands, the loss has declined to perhaps several hundred acres per year. Current rates are very difficult to document because the Pinelands Commission does not perform regular surveillance nor do they tally permitted wetland losses.

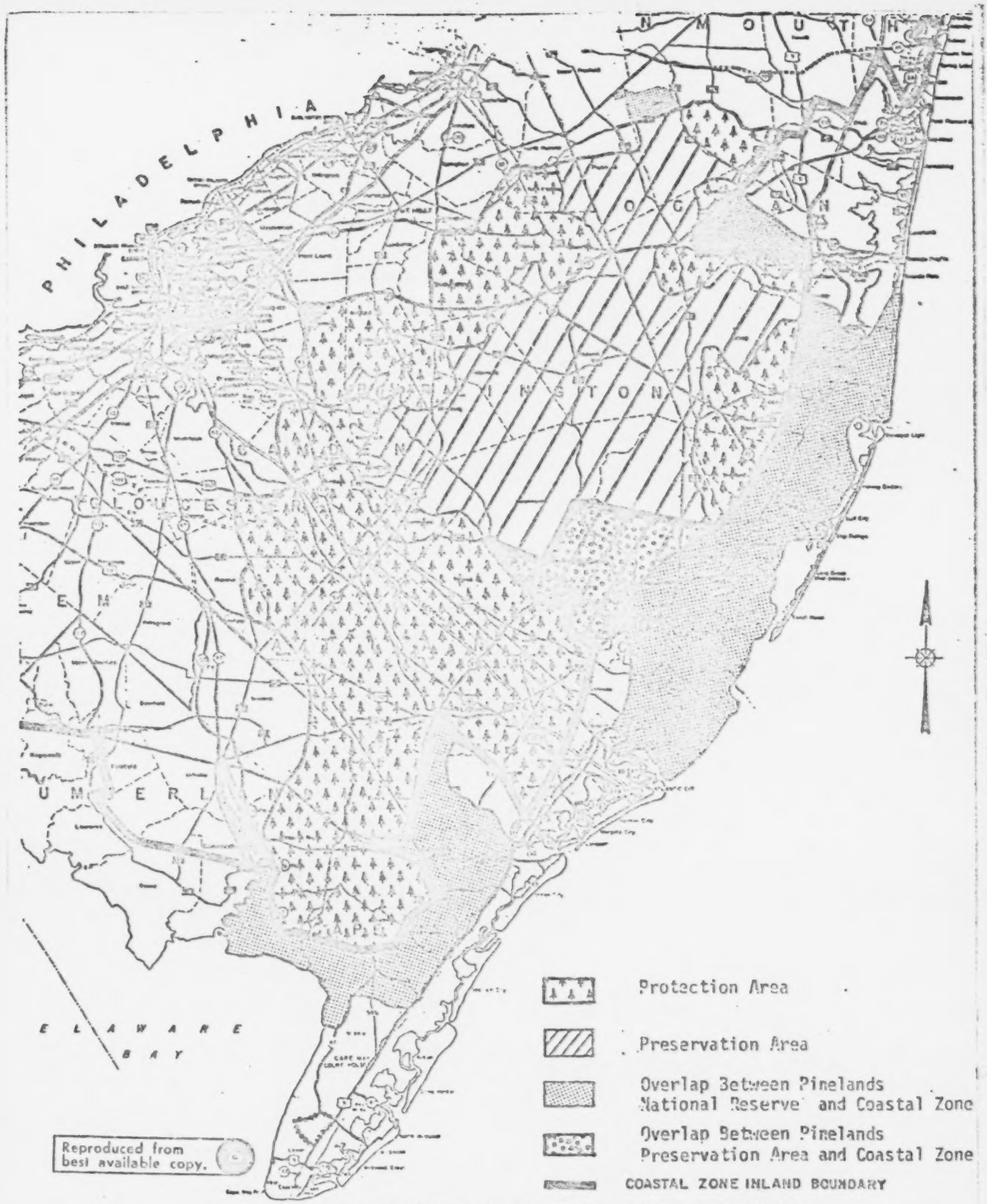
PHILADELPHIA
Protection Area
Preservation Area
Overlap Between Pinelands National Reserve and Coastal Zone
Overlap Between Pinelands Preservation Area and Coastal Zone
COASTAL ZONE INLAND BOUNDARY
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Figure 3. PINELANDS COMMISSION AND COASTAL ZONE JURISDICTIONS

Losses that are recognizable have occurred around the Pinelands periphery. For example, three townships located in the western Pinelands area (Washington, Evesham and Medford) have experienced rapid suburban growth radiating out from Philadelphia along Routes 42 and 70. On the eastern side of the Pinelands, large residential and commercial complexes sprang up in Berkeley Township near Toms River and along major east-west highways, particularly in Ocean County. In the early 1970s, several large swamps were filled to permit construction of retirement communities in Ocean County.

What constitutes a "loss" of wetlands in the Pinelands is sometimes very subjective because the effect of some activities is to alter water quality, though not wetland acreage, thus eliminating characteristic Pinelands species. For example, the State Fish and Game used to add lime and fertilizers to recreational lakes in order to raise the pH and to increase sport fish productivity. In some places nearly all of the acid water species were replaced by others such as black bass, and various sunfish species which do not occur in pristine Pinelands waters. Lime from agricultural lands has also caused a significant shift in some streams (Durand and Zimmer, 1982), and when pH shifts from less than 5.0 units to 6.0 or more, cranberry bogs are destroyed as has happened in Ocean County (P. Marucci, personal communication). However, when cranberry bogs are destroyed, the plants are replaced by sedges, rushes and other species. Similarly, stands of white cedar are often replaced by a red maple-gum-magnolia association.

In general, agriculture is compatible with the Pinelands environment. In some other states, wet soils are commonly drained to improve crop production; here, however, a substantial effort has been made to develop two crops, blueberries and cranberries, which are adapted to wet conditions. New

Jersey has about 3,000 acres in cranberry production and 7,800 acres in blueberries. About 9 percent of the nation's cranberry crop comes from here.

Atlantic white cedar swamps and bogs once occupied about 140,000 acres, mostly in the Pinelands region, but only about 45,000 acres remain. In spite of fiberglass, aluminum, and other substitute building materials, there is still a strong demand for this timber and many acres are harvested annually. In almost all instances, clear cut areas are permitted to become reforested; neither these nor other swamp lands were converted into agricultural lands after harvesting. In accordance with Pineland Commission regulations, the only exception is for cranberry production; however, the cranberry acreage has remained fairly stable in recent years (3,000 acres).

Few other activities impact wetlands in the Pinelands. Thousands of Pineland acres have been mined for sand and gravel. Generally however, mining is located in upland areas, and whatever wetland losses there have been (in acres) probably have been compensated by acreage gained when miners intersect the water table; many abandoned gravel pits now support wetland vegetation and thereby provide wildlife and in some instances fish habitat. Sufficient studies have not been performed in New Jersey, however, to be able to compare the relative values of gravel pit wetlands with undisturbed ones.

Erosion and siltation have also destroyed wetland acreage in urbanizing areas, but the extent of damage cannot be estimated.

Water Quality Change. Undisturbed "pristine" Pinelands streams are characterized by low pH (2.7-5.1) and low concentrations of nitrogen and

phosphorous (Durand and Zimmer, 1982). Agriculture and residential use in watersheds tend to increase pH (4.1-6.4) and nutrient concentrations. State water quality standards have been violated in urbanizing areas within the Pinelands (Betz, Converse Murdock, 1980). The principal sources of nutrient enrichment included septic tanks, lawn and agriculture fertilizers and sewage effect.

Biological Changes. The characteristic Pinelands species of aquatic organisms tolerate acid water conditions and when the pH is elevated, such as by drainage from urban and agricultural areas, changes in the flora and fauna usually occur. For example, undisturbed Pinelands streams can be recognized by the presence of fifteen species of fish (Lloyd, et al, 1980). When the pH rises above about 6.0, other species not characteristic of acid, low-nutrient waters replace Pinelands species.

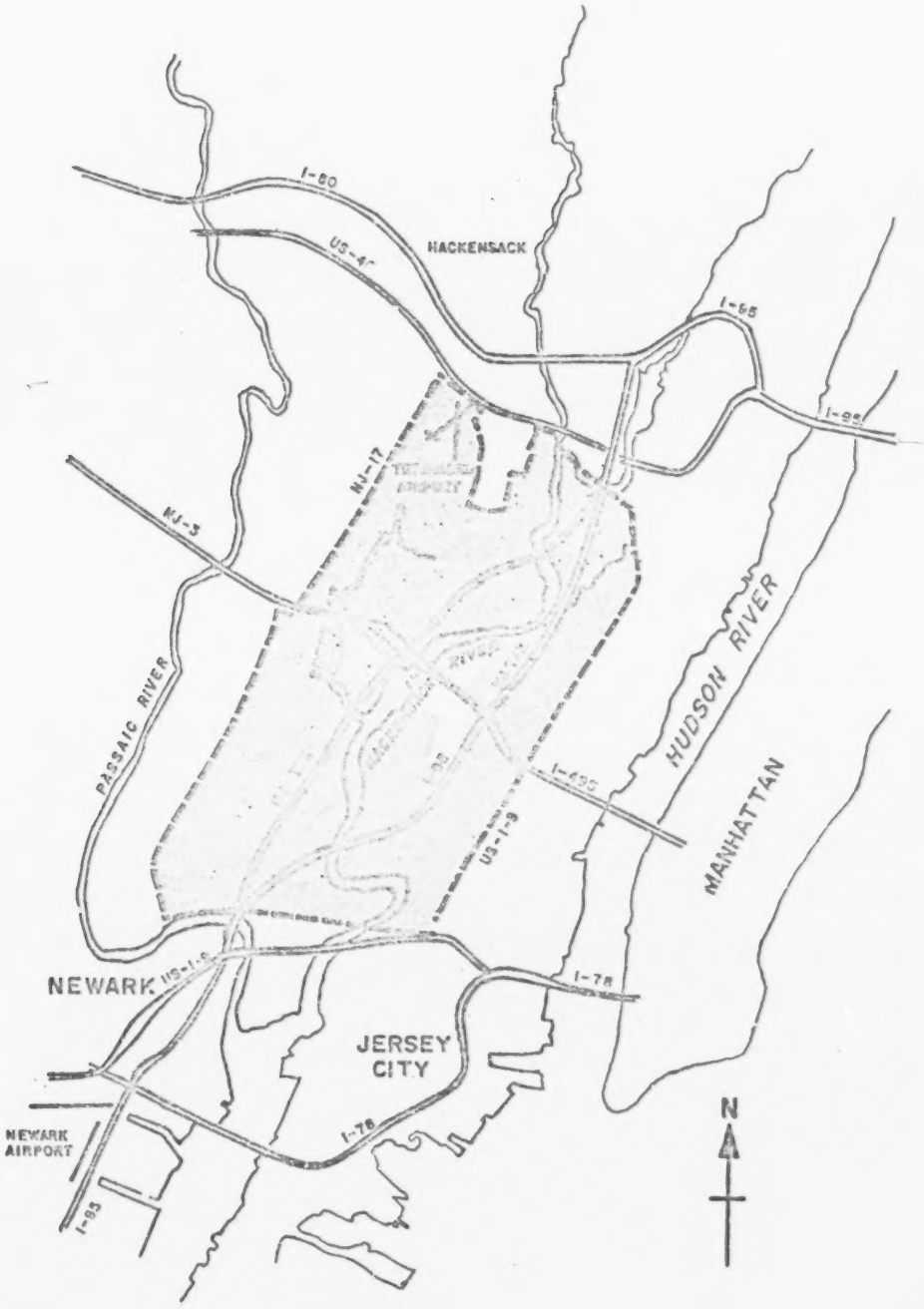
C. HACKENSACK MEADOWLANDS

The Hackensack Meadowlands is a politically defined area consisting of 19,730 acres (31 square miles) in northern New Jersey about four miles west of New York City. The boundaries were determined under the Hackensack Meadowlands Reclamation and Development Act of 1968 which created a regional organization the Hackensack Meadowlands Development Commission (HMDC) to plan for the fourteen separate municipalities in parts of two counties that were encompassed by the region. A map of the area is contained in Figure 4.

The Hackensack Meadowlands were covered 20,000 years ago by a glacier. The terminal moraine of the glacier was just south of the Meadowlands

Figure 4

HACKENSACK MEADOWLANDS DISTRICT



and acted to contain the melting glacial waters creating Lake Hackensack. Later, a rising sea broke through the moraine and allowed Lake Hackensack to drain; vegetation then flourished. Ultimately the sea entered the moraine breaks and mixed with the fresh water.

In the last three centuries, several different groups have attempted to reclaim the Meadowlands for farming and mosquito control. These attempts involved ditching to drain the wetlands and extensive earthen (and sometimes iron gate) diking to prevent the tide from re-flooding the areas. The effects of such measures were to change some wetlands from salt to freshwater and to dry up others.

However, over the years, many of these dikes were washed out or in other ways breeched and not repaired. Such events caused the previously drained areas to begin to revert back to salt or brackish wetlands. Such cycles have occurred frequently in the history of the Meadowlands and few dikes remain today. A hurricane in the early 1950's caused extensive damage to the dikes.

The Hackensack River, a tidal river, is the main artery extending from north to south through the Meadowlands. However, it really does not flow from north to south. The Oradell Reservoir was built in 1922 on the Hackensack River at New Milford, New Jersey (8.3 miles north of the Meadowlands) to capture fresh water for supplying potable water to northern New Jersey. The reservoir had the effect of reducing the fresh water flow to the river and causing the tide to flow north in the Hackensack River.

Wetland Losses. The Meadowlands have long been treated as a dumping ground. Between 1950 and 1970, hundreds of acres were used for solid waste landfilling and dumping of various types of wastes, including toxic wastes. As part of the charter for the HMDC it must take responsibility for the disposal of solid wastes of all of the municipalities that were dumping in the Meadowlands at the time that the HMDC was created. Today, the number has been increased to a total of 144 municipalities.

As of 1972, the HMDC, using old aerial photographs, estimates that between 3,000 and 3,500 acres of Meadowlands wetlands were filled between 1950 and 1970. The yearly rate of loss would therefore be between 150 and 175 acres.

As of 1972, the HMDC claims that, out of its total acreage of 19,730 in that year, 4,772 acres were wetlands. The 4,772 acres were distributed as follows:

	Acres
Shallow Tidal Bays and Flats	998
Low Salt Marsh	875
High Salt Marsh	55
Reed/Cattail Marsh	1,907
Fresh Water Marsh	533
Brackish Impoundments	414
	4,772

The New Jersey Department of Environmental Protection (DEP) claims the wetland acreage to have been 6,900 acres ± 10 percent. The DEP definition of wetlands includes "fields of phragmites at elevations less than

1 foot above local extreme high water, many of which HMDC has classified as upland fields". The HMDC bases their figures on field recordings and observations and thinks the DEP figures inaccurate because they are mostly calculated on the basis of aerial maps.

The U.S. Fish and Wildlife Service thinks the DEP figure is probably closer to being correct but is unable to say with certainty because they have never seen the definition of wetlands that the HMDC uses. The American Littoral Society in Sandy Hook, New Jersey also thinks the DEP figure is correct. The Corps of Engineers will regulate the disputed area if it meets their definition of wetlands. The rate of filling of this area was not expected to have been different before and after Corps of Engineers regulations.

The 2,100 acres difference between DEP and HMDC estimates of wetland acreage will be referred to below as the "disputed area."

Since 1972, 495 acres of wetlands have been filled in the Meadowlands; 257 of those acres had been on the original HMDC master plan, while 239 acres were added later at the instigation of the New Jersey Sports and Exposition Authority (the Meadowlands Sports Complex) and the New Jersey Turnpike Authority.

The activities taking place in those filled wetlands were as follows:

	Acres
Sports Complex	147
Turnpike Exchange	91
Public high school	257
Park and ride facility	
High density, clustered residential community and rail transit stop	
Light industry	
Office development	
Other	
Total	495

The New York Corps of Engineers records since 1975 show 46 permits being given for the Meadowlands covering only 207 acres. The difference between the 207 and 495 acres is that the former figures excludes the Sports Complex and Turnpike Exchange and other projects already approved before 1975 when the Corps began issuing permits.

The rate of loss from the 495 filled wetland acres is 50 acres per year compared to the 150 to 175 acres per year rate for the 1950 to 1970 period. (A moratorium on all building occurred from 1970 to 1972 while the plans of the HMDC were being shaped.)

In the 2,100 acres of disputed land, the ALS estimates that approximately one-third or 700 acres has been filled. The ALS was not able to say what activities took place on the 700 acres. The U.S. FWS and NJDEP could not corroborate this estimate. If this figure is correct, the loss rate increases from 50 to 120 acres per year compared to the previous 150 to 175 acres per year.

Using 1970 ERTS maps, 1972 and 1974 aerial maps, the U.S. FWS calculates 148 acres of wetlands filled in the Meadowlands between 1972 and 1974,

and 542 wetland acres filled between 1974 and 1980 for a total of 662 acres. This figure falls between the 495 acres quoted by the HMDC and the 1200 acres claimed by the ALS. Contrasting the yearly figures of 1972-1974 and 1974-1980 makes it appear that wetland losses have increased since 1974. However, the figures are distorted by differences in the timing of granting permits versus the actual fill. Also, whether or not the yearly figures are (statistically) significant different is not clear because of the short time span.

The HMDC Master Zoning Plan calls for the conversion or filling of another 1,196 acres of wetlands over the next twenty years; a rate of 60 acres per year. The uses targeted by the HMDC for development in the wetlands are not water dependent. Obviously whether these losses eventually occur will depend on the nature of the specific projects and the Corps' willingness to grant a permit. The Corps is not directly influenced by the HMDC Master Zoning Plan. They react on a case-by-case basis for each permit. The most recent example of the Corps not accepting the Plan is the case of the changes they have been seeking in the Hartz Mountain plan for the Harman Meadows (see page 3-45).

The HMDC Master Zoning Plan also has requirements for open space for many of the types of development. Of the 19,730 total Meadowlands acres, 6,970 are designated for open space. Of these, 3,576 acres are designated for the preservation of wetlands.

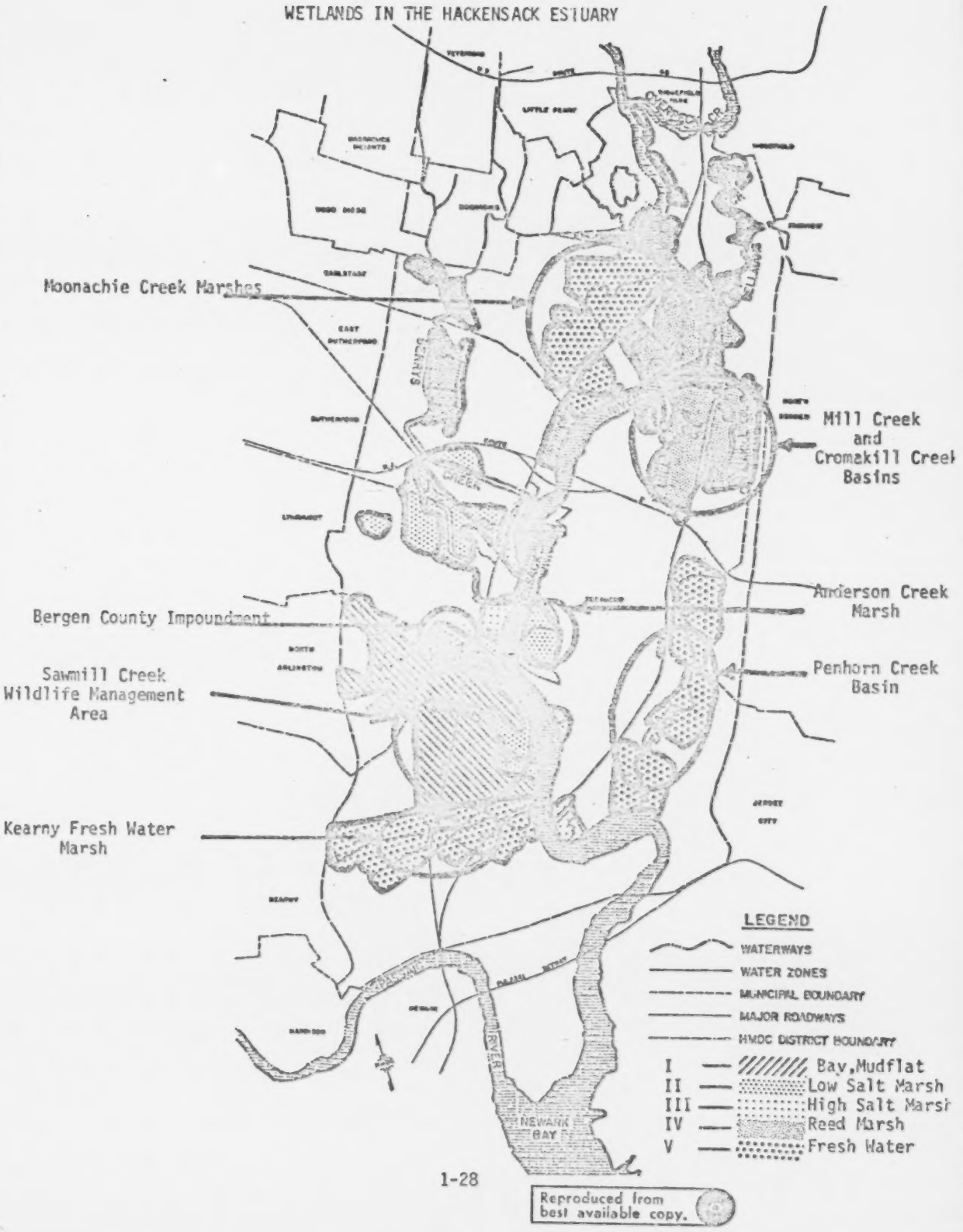
Physical Changes. As indicated above, an extensive amount of diking and draining of the Meadowlands wetlands has occurred. The dikes continue to be breeched by storms and neglected with the result that new wetlands are created each time the breeching occurs.

Also, in the period since the creation of HMDC, a large oil spill occurred, in May 1977. A river-side tank in Jersey City ruptured, allowing the oil to move northward into the estuary. The wetland vegetation recovered but the tops of the river banks that were covered do not support vegetation and erode because of it.

Water Quality Changes. The water quality of the Meadowlands has improved considerably over the past ten years. The more dramatic improvements have occurred in the southern part of the Meadowlands. The only areas not experiencing water quality improvements are the Cromakill Creek and Penhorn Creek Basins (Figure 5). A sewage treatment plant is located on the Cromakill and its inadequately treated sewage flow is too much for that part of the estuary. Since the tidal flush is minimal and the sewage only treated at a primary level, that area has very low dissolved oxygen levels. Some relief was expected to occur in the Penhorn Creek when effluent limitations were applied to a pork processing plant and to dyes from a textile plant. However, the sludge blanket on the river bottom is so thick and uses so much oxygen that the relief was not significant.

With the overall improved water quality has come the return of fish and wildlife species that had disappeared when water quality, particularly dissolved oxygen, was lower. Such fish include striped bass, bay anchovies, alewives, blue-back herring, and blue-claw crabs. In a 1980 report, the HMDC reports 36 species of fish whereas in 1968 there were only a "hardy handful."

Figure 5



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With respect to birds, the situation is similar. In 1968 there were 207 kinds of birds reported while in 1980 there were 270 (N.J. Audobon Society). Some species were not seen previously and others were more plentiful. Mute swans can now be seen as can white-winged scoters, a pair of nesting marsh hawks (first seen in 35 years), and a pair of glossy ibis.

The HMDC attributes to four factors the improved water quality: sewage treatment plant improvement, industrial wastewater discharge control, diking around the old landfills, and surveillance and enforcement of illegal dumping by the HMDC.

Only two of the ten sewage treatment plants in the Meadowlands have been upgraded from primary to secondary treatment levels. Also, as mentioned earlier, effluent limitations have been applied to a pork processing plant and a textile plant. These two developments are not under the control of the HMDC. The HMDC staff is however active in making recommendations to regional and municipal authorities treatment plans and plants that would affect water quality in the Meadowlands regarding sewage.

A number of the Meadowlands landfills existed in wetlands. Where contamination had spread, the owners were required to place dikes around the landfills. The dikes were dug deep down to the clay base and were made of clay materials to prevent leachate from migrating from the site. Permits from the Corps of Engineers were not required for these dikes since they were upland from present wetlands.

The HMDC has the responsibility of providing solid waste disposal for 144 municipalities but is not using wetlands for such purposes. They are building landfills higher and also have plans for a solid waste resource

recovery system. The present landfills are scheduled to close by the end of 1984.

Lastly the HMDC staff's continuous inspection and enforcement program has extensively cut down the amount of illegal dumping and resulting water pollution.

Supplemenatary Information. The HMDC staff are proud of their accomplishments in the study and understanding of wetlands and for the improvements that have occurred in water quality and in fish and wildlife populations. They have received acclaim for the efforts from EPA and from other notable wetlands researchers. Because of this record, the HMDC would like to have the Meadowlands designated as a Special District by the New York District Corps of Engineers. Under such a status, the HMDC would have the principal role in approving or denying permits, though the project would still technically have to be issued a permit by the New York Corps of Engineers. The Corps indicates it is unlikely to grant such status because HMDC zoning designations are too broad and are insufficient indicators of what is likely to actually occur in a wetland. The U.S. FWS is against such a designation because the HMDC has planned for wetland losses that are nonwater dependent. The HMDC has requested a member of Congress to add a clause to the Clean Water Act that would expressly create a special district status for the Meadowlands.

One issue that has occurred in the Meadowlands is over the question of whether or not wetlands have been created by the HMDC. The issue is tied in with the HMDCs desire to get Special District status from the Corps of Engineers. The HMDC would like to show that on balance the projected

wetland losses of 1,196 acres plus the 495 acres that have been filled are offset by 40 percent with created wetlands amounting to 657 acres.

The area involved in the issue is in Kearny Marsh which all agree is now a freshwater marsh. Apparently a drain pipe was once used to remove freshwater runoff from the area; the pipe became clogged and has not been repaired. Thus the runoff remains and the area has become a marsh since the early 1970s. Both the U.S. FWS and the ALS claim that the area had already been a marsh as a result of much earlier diking and that therefore no credit should be acknowledged. The HMDC claims that the area was not a marsh and points to the extensive rabbit trapping that previously occurred.

An environmental center will open this September and will overlook the Sawmill Creek Wildlife Management Area. The center was the result of a mitigation plan for the Hackensack Meadowlands Sports Complex. The idea for this out-of-kind mitigation was initiated by the New Jersey Audobon Society and Chester Mattson of the HMDC. The environmental center was not a condition of the Corps permit; it was a method to help environmental and other groups accept the project.

Lastly, the HMDC is opposed to a DEP plan to dredge Berry Creek, a tributary of the Hackensack River. The creek has mercury in the sediments; the result of a batch of mercury which was surreptitiously buried many years ago. The HMDC is concerned that the mercury may become resuspended in the water, will migrate further downstream, and enter the food chain. If however, it were demonstrated that dredging would not cause such enviornmental problems, it is anticipated that the dredge spoils would go on top of the landfill from which the mercury originally came and the landfill would then be completely sealed.

D. ATLANTIC CITY

In recognition of increased pressure to develop wetlands in and around Atlantic City, the Philadelphia District of the Corps of Engineers conducted a special study in order to facilitate permit processing and to provide guidelines for wetland uses. The Study Area, portrayed in Figures 6 and 7, encompasses about 57,000 acres, and includes Atlantic City as well as all or portions of eleven other municipalities. Of the 23,000 acres of wetlands, all but approximately 100 are tidal salt marsh. Most of the area lies within CAFRA's boundaries; however, there is a portion of Egg Harbor Township under the Pinelands Commission's jurisdiction. The freshwater wetlands (approximately 100 acres) fall into the headwater category (< 5 cfs), and the Corps has not taken jurisdiction for them.

The Atlantic City area was selected for this study because of the availability of data; also, wetlands here are fairly representative of wetlands elsewhere along the coast. Another important consideration was the newly established casino industry which has created strong pressures for residential development, especially on the mainland in Galloway and Egg Harbor Townships.

The Study Area is characterized by a series of shallow interconnected bays located between two barrier islands, Absecon and Brigantine. The tidal wetlands are mainly dominated by salt marsh cordgrass (Spartina alterniflora), but some fifteen other species occur under varying environmental conditions. The saltmarsh and adjacent wetlands support an abundance of fish and wildlife in spite of the intensive development that has occurred on the barrier islands and along the mainland east of the Garden State Parkway. The

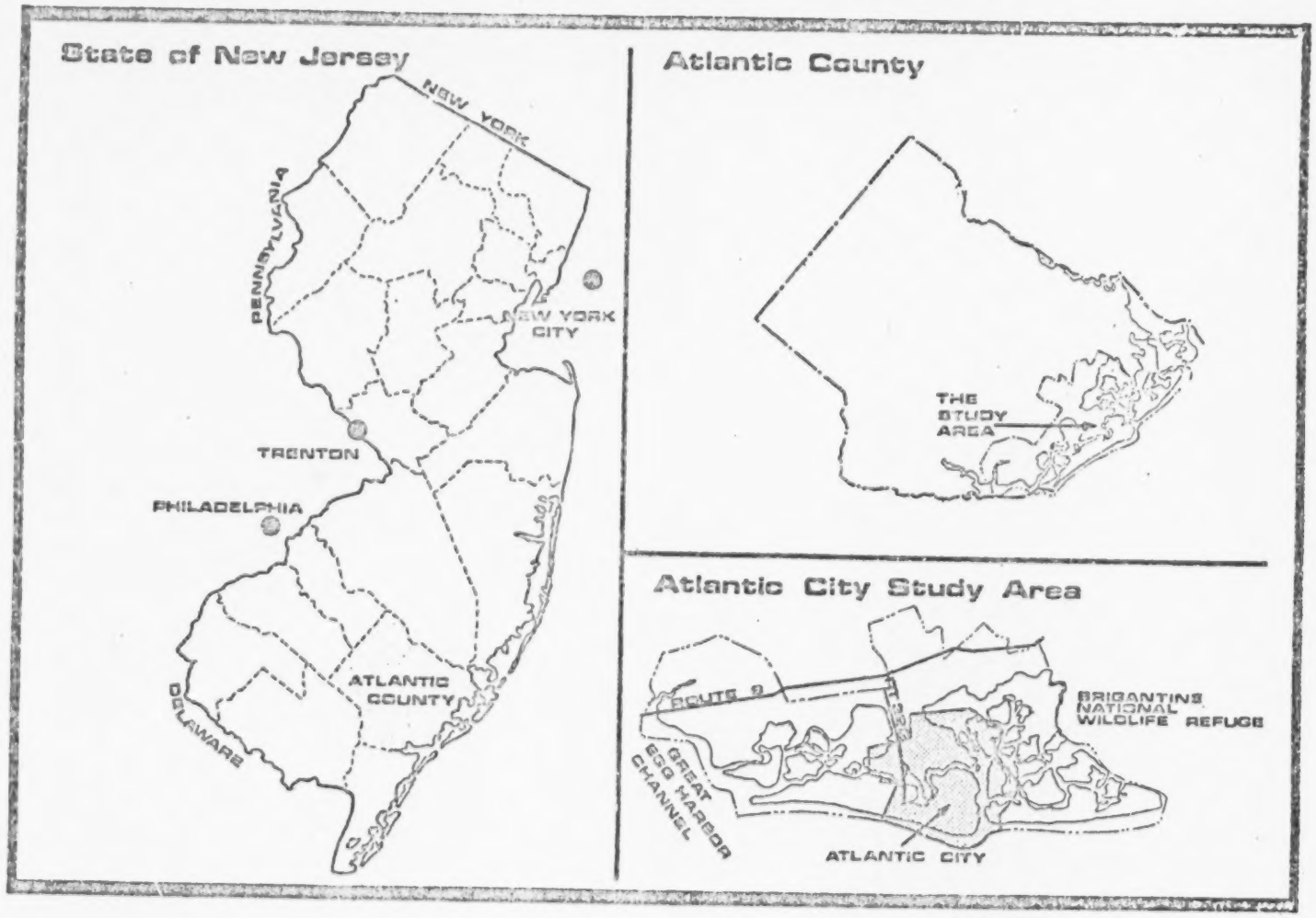


Figure 6. REGIONAL SETTING FOR ATLANTIC CITY STUDY AREA

Figure 7

DETAILED ATLANTIC CITY STUDY AREA

Brigantine National Wildlife Refuge hosts some 100,000 waterfowl during spring and fall migratory periods as well as numerous summer and winter resident species. The Peregrine falcon and bald eagle, federally listed endangered species, are commonly seen. The former nests in the Refuge. Fin and shellfish are abundant; more than fifty species occur, including many of commercial importance. Lakes Bay, located just east of Pleasantville, provides a significant proportion of New Jersey's hard clam commercial production: In 1976, for example, 20 percent of the State production came from this 996 acre bay.

Wetland Losses And Factors. Massive residential lagoon communities destroyed tens of thousands of acres of wetlands in the 50's and 60's in eastern Ocean County owing to its proximity to major metropolitan centers, but wetlands in the Atlantic City area wree not so severaly affected and remain largely intact. Transportation was a key factor in stimulating and shaping development in the Atlantic City area. First there was a rail line and road linking Absecon Island with Pleasantville and other facilities followed such as the Intercoastal Waterway, an airport, and finally in 1964, the Atlantic City Expressway which ties Atlantic City to the Philadelphia metropolitan region. However, even with pressures for development brought on by such easy access to the barrier islands, about 90 percent of the Atlantic City wetlands present when the area was first mapped in 1885 remain today (Phila. Dist. COE, 1981). According to the Corps, the lack of additional development pressure until recently was caused by widespread recognition of the hazards and costs associated with building on wetlands. These include:

- frequent flooding
- vulnerability to storms
- biting insects
- unstable soils
- the economic costs of filling.

State and federal regulation of wetlands probably had little effect between 1973 and 1980 owing to depressed economic conditions in Atlantic City. However, after the casino referendum was approved, there has been pressure to develop particularly Absecon Inlet and other areas.

Activities Affecting Wetlands. The nature of wetland losses prior to 1973 was variable. In addition to residential and commercial development, it included highway fills, marinas, landfills, as well as channel maintenance. Bader Field, the airport, was constructed on a dredge spoil disposal site; Great Island, formerly 250 acres of marsh in Lakes Bay, was filled by the Corps of Engineers; and at least five hundred acres of salt marsh were filled along the north end of Absecon Island along Absecon Inlet to provide residential and commercial property and a solid waste disposal site for Atlantic City. Altogether, several thousand acres of wetlands appear to have been lost due to dredging or filling prior to 1973. Since then, man-made losses probably have not amounted to more than a few hundred acres. In addition, it should be noted that for several of the larger or more controversial projects, the Corps of Engineers has required compensation in the form of new wetlands usually at a 1:1 ratio. For example, the construction of the Atlantic County regional wastewater treatment plant and conveyance system resulted in a loss of 18.6 acres, but 21.5 acres of salt marsh were restored. Other losses

which might be considered significant included an extension of the runway at Bader Field (which also required compensation), and the cumulative effects of bulkheading along the bay side of Brigantine Island.

Even though loss of wetland acreage has been minimal since 1973, this is not to say that the remaining wetlands are not threatened: one large Planned Unit Development (PUD), Bayshore Center, has obtained all of the necessary State and Federal permits. This project would result in the loss of 4.25 acres of salt marsh along Lakes Bay, and could cause additional damage to productive shellfish beds if a proposed marina is permitted. It should be noted, however, that the applicant proposes to create 6.61 acres of wetlands in compensation for acreage lost along the shoreline of Lakes Bay. In a separate though related project, the Corps may dredge Lakes Bay in order to restore the channel. Although dredge spoils would not be placed on tidal salt marsh, secondary impacts of this project (increased boating, new marinas, etc.) may have a major adverse impact on water quality and the shellfish industry.

Waters and wetlands elsewhere in the Study Area are threatened by development in or near non-tidal freshwater wetlands. The Atlantic City casino industry has been largely responsible for upsurges of residential and commercial construction in eastern Atlantic County. For example, building permits issued in Atlantic City during the first quarter of 1981 increased by 327 percent compared to the first quarter of 1980 (McDonnell, 1982). Two major PUD's, Smithville and Wrangleboro, totaling more than 8,000 units are under construction. In addition, in eastern Atlantic County there have been numerous projects located just outside of the defined wetland areas or limited in size so as to avoid State CAFRA and Federal 404 permits. Al-

though wetland acreages are not specifically affected, runoff from these projects threatens to degrade ground and surface water and thereby adversely affect fresh and saltwater wetlands.

Physical Changes. Erosion and deposition, caused by natural and man-made processes, have had a measurable effect on wetlands but probably less than 100 acres of tidal salt marsh has been affected in the 100 years betweeen 1850 and 1950. However, photorevised topographic maps show that between 1951 and 1972 several hundred acres of barrier beach have been lost on Brigantine Island and perhaps half as much salt marsh. Examples of salt marsh loss can be seen near Brigantine Inlet on Eider Island and at Great Egg Harbor Inlet opposite Longport. There are gains as well as losses. Near Brigantine National Wildlife Refuge, soil core samples have shown that as a result of rising sea levels, salt marsh has formed on top of what was once freshwater marsh and upland areas (Psuty, personal communication). This process is widespread but very slow, and overshadowed by wetland losses due to erosion.

Water Quality And Biological Changes. Specific impacts from the loss of vegetated wetlands on physical, chemical and biological characteristics of the Study Area cannot be separated from other factors such as degradation of water quality. Stormwater runoff, sewage discharges, overfishing, cyclical patterns among populations of certain species, and a host of other natural and man-made factors is manifested by diminishing shellfish harvests, increased acreages of water too contaminated for shellfish harvest, reduced abundance and species diversity amongst fin fish, as well as the widespread presence of heavy metals and pesticides in the food chain. It is important to point out

that some of the most significant factors affecting estuarine waters in the Atlantic City area are indirect and are taking place many miles from the Study Area. For example, there is concern that the waters of Great Bay and the lower Mullica River (the norther boundary of the study area) are becoming more saline as increasing amounts of freshwater are lost for consumptive purposes. According to Don Maxwell, a local shell fisherman, hundreds of acres of once productive oyster beds have been eliminated in Great Bay. This, however, could not be confirmed by Thomas McCloy, the State shellfish specialist. Another problem is erosion in urbanizing areas: increased turbidity and siltation result in subtle changes which are difficult to detect, but lead not only to the loss of productive habitat, but also diminish the rate of nutrient cycling, a driving force of estuarine ecosystems.

There are large landfills in the Study Area, some of which may influence water quality in fresh and salt water wetlands in the Study Area. According to the Bureau of Coastal Zone Management, the former Atlantic City dump located at the north end of Absecon Island (now under Harrah's Casino) was a source of toxic seepage. Price's Pit, located in Pleasantville, has been designated by the U.S. Environmental Protection Agency as one of the ten most dangerous solid waste disposal sites in the United States. Contaminated ground water emanating from the site has forced the closure of one of Atlantic City's ten wells. A multimillion dollar study is now underway to determine how to replace the existing potable water supply.

Chapter 2

ECONOMIC, TECHNOLOGICAL, AND SOCIAL FACTORS AFFECTING WETLAND USE

ECONOMIC FACTORS

The fastest growing areas of New Jersey with respect to population are Ocean and Atlantic Counties (Figure 8). Other expected areas of growth are west of Morristown (northern New Jersey), around Princeton and in whatever city is designated as an enterprise zone under the Reagan Administration's Urban Enterprise Zone Program.

The growth in the southern counties (in Ocean and Atlantic Counties) is expected to consist of the type of coastal growth that has always occurred in that area, i.e., second homes. In addition, the growth of first homes will be accelerated because of introduction of casinos in the area. In northern New Jersey, there has been a proliferation of offices and light industry expanding westward from the eastern edge of the State. Many of the offices are corporate headquarters which have moved from New York City because of high costs. The recent completion of Interstate Route 80 and the presence of other interstate expressways has helped to provide incentives to locate in these areas.

The concern for the protection of wetlands in the above two areas arises because of the low costs of wetlands acquisition and fill costs as compared to the high values of surrounding land, as well as the pressures to use wetlands for boating facilities. During the 1950s, tidal salt marsh in the southern New Jersey coastal areas was approximately $50 per acre. Today, developed land ranges in value from $5,000 - $50,000 per 1/8th acre lots.

Figure 8

NEW JERSEY COUNTIES

Many of the homes built in this area are on lagoons where boating use and access is possible for the many families interested in boating. More growth in the coastal areas also means more marinas, a water dependent use.

A characteristic of Atlantic and Ocean counties are the now heavily-populated barrier islands. Federal subsidies especially for roads, water supplies, and wastewater facilities have aided considerably in the development of those islands and in the repair of homes damaged by the periodic storms. A similar economic observation can also be made with respect to inland developments in floodplains that are protected by Corps of Engineers and other stormwater management projects, as well as "subsidized" by the Federal floodplain insurance program.

The fact that developers are no longer able to fill wetlands has definitely altered residential housing patterns in Ocean and Atlantic Counties. As the above information on wetland trends showed, many coastal wetlands were filled in during the 1953 to 1973 period. It was during this period that lagoon communities consisting of several thousand units each were built and development continued on the barrier islands. Assuming historical trends would have continued, many wetlands would have been filled in to meet housing demands in these two areas had it not been for wetlands legislation.

Pinelands. The most prevalent industries in the Pinelands area are manufacturing, government, services, retail and construction (Table 2)

Even though agriculture provides only 1.3 percent of total Pinelands income, its size in terms of acreage is important to the Pinelands. The Pinelands had 2,719 farms in 1978 comprising a total acreage of 346,732 or one-third of the total farm acreage of New Jersey and one-third of the total

Table 2

LABOR AND PROPRIETOR INCOME FOR THE PINELANDS AREA

	$ In Millions	Percent
Agriculture, Forestry, Fisheries and Related	$ 101.7	1.3
Mining	16.4	.2
Construction	466.4	6.1
Manufacturing	1,715.6	22.4
Transportation	520.8	6.8
Wholesale	434.9	5.7
Retail	1,041.9	13.6
Finance, Insurance and Related	394.1	5.2
Service	1,390.0	18.2
Government	1,566.2	20.5
	$7,648.0	100.0

Pinelands area. Acreage actually harvested amounted to 205,332 or 59.2 percent of all Pinelands farm acreage. About 58,000 of the 205,332 acres are in the Pinelands Protection area (Figure 3, above).

The manufacturing sector in the Pinelands is well diversified and evenly divided between durable goods and nondurable goods. The resource-related industries of food products, wood products, stone, clay and glass manufacturing represent the largest manufacturing sector, comprising 20.7 percent of the Pinelands area employment in 1980.

The construction industry's economic status has been greatly assisted by the spillover of housing demand into the Pinelands area from Atlantic City. In addition, during the 1960's and 1970's a large number of residential retirement communities were built in the Pinelands.

The size of government in the Pinelands area is influenced not only by local government employment and services but also by major federal installations. The facilities of Fort Dix, Maguire Air Force Base, Lakehurst Naval Air Station and the National Aviation Facilities Experimental Center make the Federal government the largest employer in the region.

Apart from the above discussion of specific industries, a substantial amount of area income comes from outside the Pinelands area. Approximately 22 percent of total area income represents the net effect of commutation jobs, i.e., more residents earning income outside the area than outsiders earning income in the Pinelands. Dividends, interest and transfer payments amount to a high 28.3 percent of total area income. The high level is attributable to a large retirement community.

A related important characteristic of the Pinelands area is the relatively intense economic activity that occurs just outside the borders.

Figure 9 shows the major retail centers of south New Jersey. All of the biggest retail centers are just outside the borders of the Pinelands. Figure 10 shows where the major increases in employment occurred during the 1972-1978 period; again most are just outside the Pinelands borders. A somewhat different story occurs with building permits issued between 1970-1978. The Pinelands is sharing equally in the number of permits issued with those issued for the areas just outside the Pinelands borders as Figure 11 shows.

Woven together with the trends in housing and retirement communities is the trend in the travel and tourism industry in south New Jersey. In 1976, there were 108,800 jobs in travel and tourism for the entire state; the State projects that figure to rise to 500,000 by 1990. The Pinelands area benefits considerably from such activities including the recreation homes built within the area and the services provided to people traveling through the Pinelands to get to some of the coastal areas to the east of the Pinelands area.

With regard to economic pressures on the development of wetlands, the Pinelands Commission Master Land Use Plan speaks for itself on the existence of such pressures. However, the Plan is intended to preserve and protect all water resources including the 18 trillion gallon freshwater aquifers. To the extent that wetlands are part of the overall water resources, the Plan protects such resources from economic pressures.

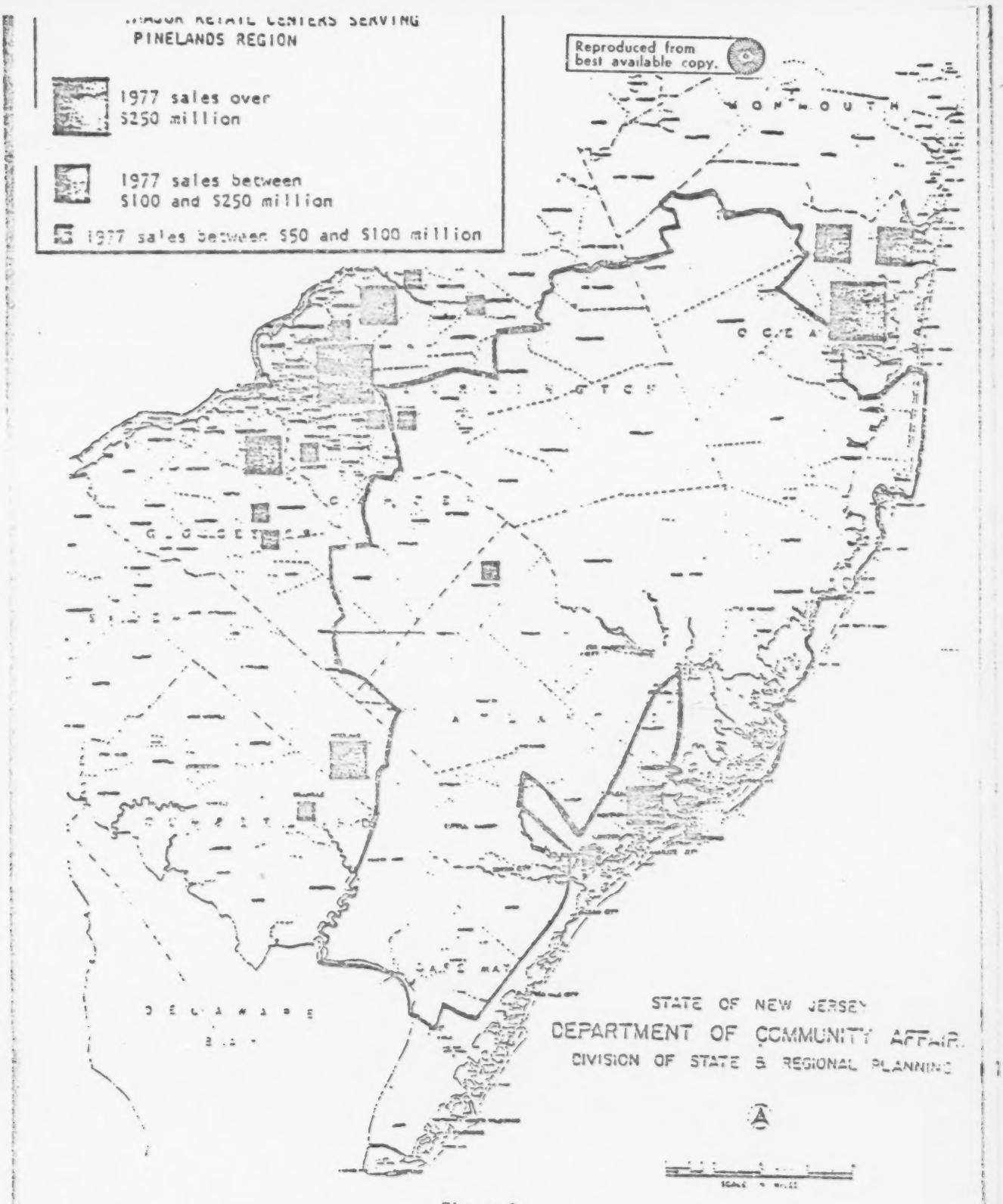


Figure 9

SOURCE: Census of Retail Trade (1977)

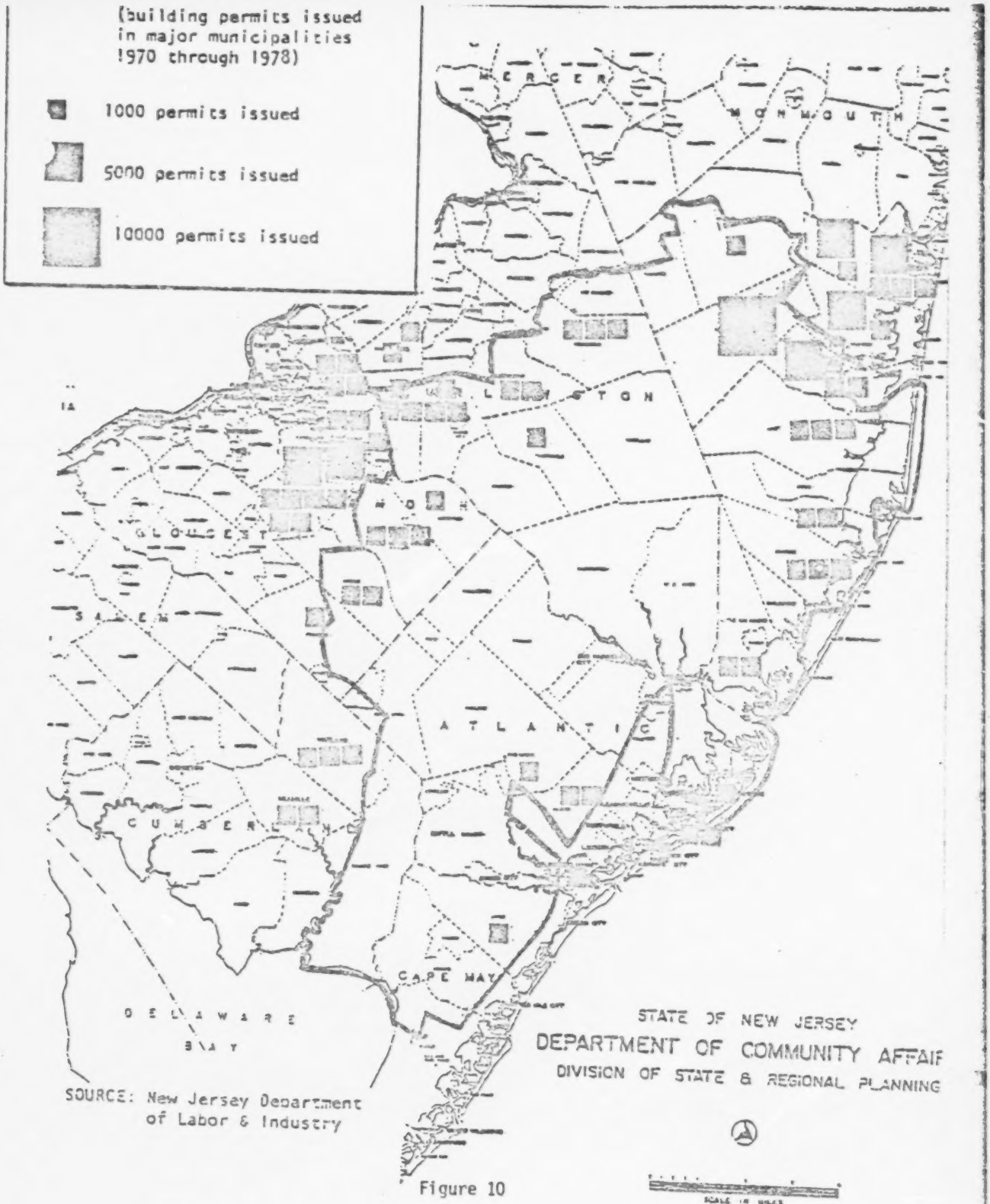

(building permits issued
in major municipalities
1970 through 1978)
1000 permits issued
5000 permits issued
10000 permits issued
MERCER
MONMOUTH
OCEAN
ATLANTIC
CAPE MAY
DELAWARE
BAY
STATE OF NEW JERSEY
DEPARTMENT OF COMMUNITY AFFAIR
DIVISION OF STATE & REGIONAL PLANNING
SOURCE: New Jersey Department
of Labor & Industry

Figure 10

Reproduced from best available copy.

Figure 11

Hackensack Meadowlands. The dominant economic influence in the Hackensack Meadowlands is the Master Zoning Plan created in 1972 and amended several times since. The Plan does not forbid wetlands development and calls for development of 1,196 acres of wetlands over the next twenty years. Somewhere between 7,800 and 8,260 acres of developed land existed in 1972 and that figure will increase to 12,104 acres as wetlands, disputed wetlands, and non-wetlands are filled in or developed (with no fill necessary) over the next twenty years. Also under the Plan, 6,900 of the 19,730 total acres will be open space, a significant amount of which is wetlands.

The types of economic development expected to occur in the 1,196 wetland acres to be filled are non-water dependent; i.e., housing, office and shopping center complexes, and light industry. The economic development in wetlands prior to the HMDC were landfills, transportation (particularly warehousing) and manufacturing. Now, little demand is expected for manufacturing since the Northern New Jersey area is losing manufacturing jobs. The HMDC is attempting to attract people who would otherwise move from northern New Jersey out of the area. The HMDC is counting on a well-managed wetlands environment and its related recreational and aesthetic opportunities as one way of attracting such people.

Land values in the Hackensack Meadowlands are very high at $100,000-$150,000 per acre; they were around $1,000 per acre in the mid-1960's. While the HMDC takes some responsibility for such increases as a result of the Plan, they also cite the general unavailability of land so close to New York City as a more important factor.

Atlantic City. The area of Atlantic City covered by this case study is definitely a growing area spurred almost entirely from long-term rising trends in tourism and travel for coastal areas and the advent of casino gambling. Each casino employs between 3,000-4,000 people and nine casinos have opened within the past three years.

Atlantic County's Future Land Use Plan of August 1981 estimates that by 1990 there will be a 41-percent increase in the number of houses from 89,445 in 1980 to 126,455. The average number of permits issued in 1981 however fell short of the yearly projected demand (2,055 issued instead of the 3,700 anticipated). The number of permits is still large for the area but falls short of projected demand probably because of high interest rates and the fact that demand is based on estimates for a higher number of casinos than the actual number that have opened to date. In addition, because of the high cost of living in the area, many casino workers are reported to share housing to save expenses.

There is little doubt that, without the regulation of wetlands by New Jersey and the Federal government, much of the new housing for the Atlantic City area would have been placed on filled wetlands. The effect of the CAFRA and Pinelands Commission regulations are to alter housing distribution from what it otherwise would have been. The zoning of the Pinelands Commission allows for development in the Atlantic City portion of the Pinelands area and the Commission claims through independent studies that residential housing demand will not suffer as a result of the Commission's Plan.

TECHNOLOGICAL FACTORS

Technology has had both negative and positive effects in wetlands in New Jersey. In the twentieth century, draglines, bulldozers and variety of other types of construction equipment were used to dredge and fill wetlands. Chemical contaminants including insecticides have affected salt- and freshwater marsh ecology, while the effluent from industrial and municipal wastewater treatment facilities have degraded water quality. In the last 10 years, there have been marked improvements. For example, the improved wastewater treatment facilities in New Jersey's coastal communities have opened up areas formerly closed to shellfishing.

Many of the techniques for open marsh management to control mosquitoes were developed and tested in New Jersey's coastal salt marshes. These techniques, which were developed in the late sixties and early seventies are seen to be the best specific example of the effect of technology on New Jersey's wetlands. The objective of open marsh management is to minimize disturbance to beneficial species while at the same time eliminating breeding conditions for mosquitoes. To accomplish this, special equipment, a rotary ditcher, was developed. The ditcher spreads a thin layer of dredged material evenly over vegetated salt marsh areas which permits rapid recovery of the area. In the old method, clumps of sod heaped along the side of ditches blocked tidal flow across the marsh and often caused subsidence. The now low-lying, poorly drained areas provided a breeding habitat for mosquitoes, thus in many instances the old methods for mosquito control were counter-productive and in some instances harmful to fish and wildlife (e.g., application of highly toxic pesticides such as DDT). While not every aspect of open

marsh management is beneficial, in general the impacts of this method affect fish and wildlife less adversely and in some instances wetland habitats can be enhanced (Ferrigno, personal communication).

SOCIAL FACTORS

State government staff members feel that the citizens are well informed about wetlands, their values, and the need for their protection in areas of New Jersey which are under the jurisdiction of the 404 Program, the Wetlands Act or the Coastal Areas Facility Review Act (CAFRA), which are discussed elsewhere. Certain other specific areas such as the Central Passaic basin in the State have also been "sensitized" by active watershed or other citizen groups or by the State Fish, Game, and Wildlife offices. Thus they are prepared to do battle to protect and preserve wetlands for ecological reasons, as well as for water quality, water supply, and flood protection reasons.

However, without these catalysts, or even with them, the local municipalities and their citizens are seen as being more concerned with increasing tax ratables and ensuring a return on investments in property than with environmental protection.

With respect to how permits were administered, CAFRA staff members observed that at least some of the developers preferred to deal with CAFRA rather than with local zoning boards for several reasons. Since CAFRA had specific policies spelled out for most development conditions, their decisions were more predictable to deal with. CAFRA observed that, if a developer came from out-of-town, he would often find the individual preferences of local zoning board members too unpredictable and perhaps even capricious. If they

were local developers, they also apparently preferred to fight their battles with the more remote State than with a neighbor on the zoning board.

Environmental groups, on the other hand, are very concerned about the short-term view they sense at all levels of government. At the State level, some of the perceived myopia may be due to the narrow scope of the laws under which wetlands can be protected. This is especially true of not only the floodplain laws but also the water quality laws. In a given situation, an argument for perhaps minimal water quality enhancement, for example, may not be successful in protecting a wetland, but if arguments for flood protection and/or water supply as well as ecological values could all be marshalled together, the wetlands could perhaps be protected.

Environmental groups are concerned about the short-term view of municipalities represented by the community in the Central Passaic that zoned all the best land for residential use and designated wetland areas for its commercial and industrial growth. In the arc of current development about thirty-five miles west of New York City, the pressures are tremendous to use the large and apparently "useless" wetlands in this way.

In the scramble to develop, environmentalists feel that not only are long-term environmental considerations often ignored but also area-wide consequences are not taken into account. If large wetlands (which are below the 5 cfs Corps limit of jurisdiction and outside the legally defined floodplain) are filled in by an upstream community for an industrial park or for gracious corporate headquarters, there is no consideration in the upstream community of the possible downstream affects of increased stormwater flow, not to mention possible water supply problems if the wetland is a groundwater recharge area.

It is also apparent to environmental groups that evaluations of costs and benefits to society as a whole are meaningless at the local level unless jobs are developed as a result of the analysis. If reduced long-term costs mean that fewer or no construction projects are built and maintained and therefore fewer or no new jobs created, political pressure is often applied relentlessly. The local areas are interested in costs being kept at a mimimum for them through payments made by society as a whole, while the benefits are retained at the local level. The acquiescence of state flood-plain and of some Federal program staffs to this pressure for the creation of jobs (rather than overall savings) is undoubtedly one reason why the environmental groups see these programs as being "cement- or structure-oriented."

The environmental groups are also concerned to some extent with the land use planning context of many decisions. They see it as growth-oriented, rather than oriented toward the protection of limited resources. On the other hand, the N.J. Audubon Society looks with some favor on the HMDC. They saw how bad water quality was before the HMDC was created and how much it has improved under the HMDC.

Chapter 3

LEGAL AND INSTITUTIONAL FACTORS AFFECTING WETLAND USE

This section is divided into two main parts. The first deals with the principal programs affecting wetlands including the Federal §404 program as well as programs emanating from the State of New Jersey and its subdivisions. In each case, we will discuss the type of involvement the program has with wetlands, how active it has been, and how effective it has been in the preservation of wetlands of different types. The last of these topics will reflect the judgment not only of people directly involved in the program but also of knowledgeable environmental groups.

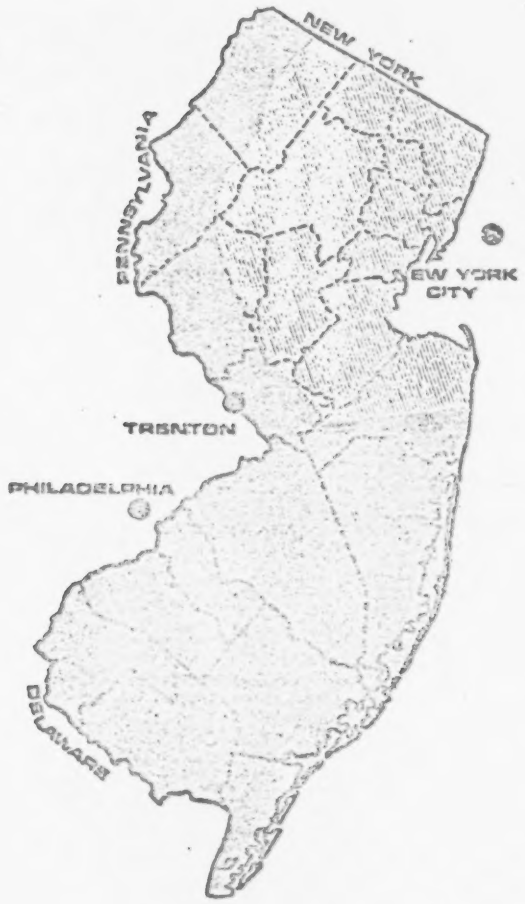
The second section will discuss these wetland programs in the context of three regional cases: the Hackensack Meadowlands Development Commission, the Pinelands Commission, and the Atlantic City area.

The Federal 404 Program

In New Jersey, the Section 404 program under the Federal Clean Water Act is administered by the two Corps of Engineers Districts of Philadelphia and New York, both under the New York Division. The Philadelphia District's jurisdiction includes about two-thirds of the State and covers the Delaware Basin (western New Jersey) and from the Manasquan River south to Cape May (Figure 12). Central and northeastern New Jersey are covered by the New York District. Both Districts administer tidally flowed, navigable waters (Phase I) as well as inland waters and wetlands (Phases II and III). Phase I, II, and III wetlands were taken under jurisdiction by both Districts on schedule; that is, in 1975, 1976 and 1977.

Figure 12

CORPS OF ENGINEERS DISTRICT JURISDICTIONS IN NEW JERSEY



NEW YORK DISTRICT

PHILADELPHIA DISTRICT

With relatively minor exceptions, the New York and Philadelphia districts have the same criteria for determining jurisdiction in individual wetland cases. Most differences are due to interpretation of words such as "adjacent." For example, where a land which supports wetland vegetation is separated from a clearly jurisdictional area by a barrier such as a berm or dike, the Philadelphia District calls it an adjacent wetland. An illustration along the Delaware River is a vegetated wetland area near the town of National Park, New Jersey where the Philadelphia Corps of Engineers claims jurisdiction over wetlands located behind a berm and protected by a one-way tide gate. The New York Corps of Engineers does not take jurisdiction of wetlands adjacent to tidal waters which appear to be maintained by upland drainage. This can be a particularly difficult distinction to make.

Both Districts define "isolated wetlands" as wetlands greater than 10 acres and including a natural lake. In theory they take jurisdiction, providing that there is at least some standing water on the site (no minmum acreage) but in practice there have been very few instances where either District has taken jurisdiction in an isolated wetland (Eldstrom, Denmark, personal communication). Therefore, the inclusion of isolated wetlands under the nationwide permit program would not have a significant effect on wetland protection unless the COE changes other policies regarding jurisdiction.

Both Districts adhere to 33 CFR 323.4-2(a)(1), the provision which limits Corps of Engineers' jurisdiction to waters and adjacent wetlands greater than 5 cfs. Philadelphia makes this determination in-house on a case-by-case basis whereas the New York District contacts the U.S. Geological Survey to delineate 5 cfs lines. Both Districts require the applicant to delineate project boundaries on U.S. Geological Survey Topographic

or other suitable maps; this enables the COE to locate the project in relation to the 5 cfs line.

The 5 cfs policy has had important consequences especially in South Jersey where thousands of acres of swamp are not protected for this reason. The Philadelphia Corps of Engineers has not yet taken discretionary jurisdiction over any headwaters wetlands, but this was a distinct possibility for one large Planned Unit Development now being built next to the Brigantine National Wildlife Refuge. The threat of 404 prompted the developer to stay out of the wetlands.

In North Jersey, some of the most important wetlands are located in the Passaic Basin. These include the Great Piece Meadow, Black and Hatfield Swamps and Troy Meadows. The New York Corps of Engineers has not taken jurisdiction for projects located in headwater regions; however they have done so downstream from the 5 cfs line. In one case, which is now being considered by higher Corps of Engineers' authorities, the U.S. Fish and Wildlife Service and the U.S. EPA have urged the New York District to take jurisdiction over a project that threatens the 400-acre Lee Meadow. This wetlands area is located in the Passaic Basin at the headwaters of Malapardis Brook. The Fish and Wildlife Service points out that besides being of ecological importance during rainstorms, Lee Meadow provides temporary storage for runoff, a quality that is difficult for the Corps of Engineers to ignore since the New York District is in the middle of a multimillion dollar flood control study of the Passaic Basin. The U.S. EPA pointed out that Lee Meadow should be preserved for the same reasons cited above and because developing the site threatened ground and surface water quality (Gruber, personal communication). The COE considers comments supplied by Federal

agencies on matters beyond their specific areas of expertise (such as flood control for the FWS) but final decisions are usually based on information from specialists in the field of concern. To date, however, the New York Corps has not taken jurisdiction because Lee Meadow is a "headwater".

Permit Processing. The number of permits processed in each of the two Districts is roughly the same: in fiscal year 1981, the Philadelphia District received 834 permit applications and the New York District received 987. (It should be noted that the total for Philadelphia does not include any District General or Nationwide Permits which New York included in its total). There are no precise figures for New Jersey's share in each district, but of Philadelphia's 834 applications, roughly 700, or 80 percent are for New Jersey and of New York's 937, approximately 30 are for New Jersey. A breakdown of permits from the Philadelphia District is presented in Table 3-1. Figures obtained from the Philadelphia District indicate that while the number of permits issued appears to have decreased, however, the amount of work has not changed because except for 1980, the number of DA and letter permits granted has remained fairly constant. These permits require complete administrative procedures by the Corps. Many projects which before would have been given a Department of the Army (DA) permit may qualify for a District General Permit which require only minimal administrative effort by the Corps. Public notices are not issued for such projects. The Corps merely reviews the applicant's plans and issues a letter which states that the project is covered by a specific District General permit. Similar steps are taken for Nationwide permits if requested by an individual.

Table 3-1

404 PERMITS GRANTED BY THE PHILADELPHIA AND NEW YORK

DISTRICT CORPS OF ENGINEERS

	1982[1]	1981	1980	1979	1978	1977	1976	1975
Philadelphia								
Applications received[2]	481	834	943	1032	1242	1598	1293	-
DA Permits granted[3]	169	401	434	488	455	443	702	249
Letter Permits[4]	170	157	1	68	68	88	310	315
Letters of No Objection[5]	-	163	352	418	418	923	346	NI
District General Permit	52	133	111	NI	NI	NI	NI	NI
Nationwide Permits	269	122	73	NI	NI	NI	NI	NI
Denials	9	5	4	9	16	9	22	NI
Withdrawals	54	56	103	90	79	118	-	-
New York								
Permits Granted		987						
Individual[6]		440						
District General		85						
Nationwide		462						
Denials[7]		1						

[1]As of the end of third quarter.
[2]Application figures do not include District General or Nationwide Permits, but do include denials and withdrawals.
[3]Require the full application procedure
[4]Letter Permits are issued for minor projects; administratively they are handled the same as a DA permit. The difference is that a Public Notice is often not issued; however, the federal regulatory agencies are notified of the project and have an opportunity to comment on it.
[5]Letters of No Objection are no longer used. They amounted to an abbreviated DA permit in which the District Engineer stated that after outside reviews of the Public Notice there was no objection to the project.
[6]Six to seven percent are after-the-fact permits.
[7]Denial means outright refusal. Two to six permit applications were also administratively denied because the project has been denied at the state or local level.

NI = No information

The trends for the New York District are that the number of permits granted has remained fairly constant but the mix by type has changed. The long term trend is that the number of individual permits have decreased while district general and nationwide permits have increased. A factor that is adding to the New York District's workload are Letters of Determination that are sought by local zoning boards, particularly in the Passaic River Basin of northern New Jersey. In certain geographical areas, developers are required to obtain a Letter of Determination from the New York Corps of Engineers as to whether or not the Corps has jurisdiction over the area of development. This workload amounts to the equivalent of two full-time people, according to the New York District.

In general, it may be said that of the applications received, many fall under either Nationwide or District General Permits, and many are withdrawn. Very few applications are denied, especially in the New York District, which has the longest processing time of any Corps district, but the fewest denials. New York averages about one denial per year and Philadelphia about 11. (The New York figures exclude administrative denials of 2-6 per year where the project has been denied at the state or local level.) In New York, 80 percent of original applications are modified in some way. In the Philadelphia district, about ninety percent of applications are modified in some way by the District Engineer; about 30 percent constitute major plan modifications (F. Cianfrani, personal communication.) The nature of modifications is variable, but many are aimed at protecting wetlands and shallow water habitat in residential lagoon systems and bayshore.

It is evident that permit processing now functions more smoothly and generates less antagonism than four or five years ago when the program was

new. There are a number of reasons for this. Certainly the increase in the number of projects eligible for Nationwide General Permits must be an important factor; public awareness and education is another. According to the Chiefs of both Permit Branches, applicants and their consultants are much more knowledgeable about the types of projects which will or will not be approved. Part of this is due to public acceptance of the intent of 404, and part is due to dialogues initiated during pre-application conferences. These conferences have been valuable for both regulators and applicants (Creamer, Denmark, Sawhill, Hansen, personal communications) and both Districts agree that pre-application conferences have saved significant amounts of wetland acreage. The pre-application conference serves several purposes. It enables the prospective applicant to find out how much of his property can realistically be developed and what type and level of detail of information will be required for the permit application. The pre-application conference is an opportunity for applicants to become familiar with the regulations. It allows the Corps of Engineers to educate the prospect on wetlands values and the reasons for the regulations. The Philadelphia Corps of Engineers has found that people are much more reasonable and willing to work out a satisfactory agreement if they have an understanding of the reasons behind 404. One developer we questioned about the value of pre-application meetings approved of them emphatically.

In addition to standard "pre-application" conferences, both districts have other pre-application mechanisms. For example, in Philadelphia, the Urban Waterfront Action Group reviews activities along both sides of the Delaware River between Trenton and Wilmington. The group includes representatives of all federal, state and local agencies which have an interest in

wetlands. Applicants are provided with an opportunity to present their plans, establish a dialogue with regulators, and to be advised concerning individual agency concerns or jurisdiction. It is not always easy to get on the agenda of the Urban Waterfront Action Group owing to the number of projects reviewed, an indication of the high regard developers have for the Group.

Perhaps another reason why the 404 Program is running more smoothly now as compared to the late seventies is improved consistency. Both Districts apply the water dependency test to all projects and developers are now aware that non-water dependent use permits involving fill in tidal areas are extremely difficult to obtain. Precedence was set early in the program, at least for tidal wetlands; however, freshwater wetlands are still threatened. The U.S. Fish and Wildlife Service reported that decisions in North Jersey's freshwater wetlands are not always consistent. Salt marsh wetland acreage is still being lost, but mainly for public projects (such as the Bader Field runway extension), and in almost all instances compensation (creation of new wetlands) is required.

Permit processing has been expedited partially as a result of Nationwide General Permits, but also because of Joint Permit Processing. Once each month all federal agencies, i.e., the Corps of Engineers (both Districts), the Environmental Protection Agency, the Fish and Wildlife Service, the National Marine Fisheries Service, and usually a representative from CAFRA (NJ DEP) meet to discuss permits. These meetings provide the Corps of Engineers with an opportunity to present relevant information concerning individual applications and receive agency comments including "No Objections".

Each of the federal agencies interviewed had favorable comments about Joint Permit Processing.

The subject of cumulative impacts is one of the toughest issues to deal with, according to the New York Corps of Engineers. Apparently the nationwide guidance on cumulative impacts is inadequate in being applied in many instances. The New York Corps of Engineers attempts to minimize the specific impacts of individual projects as one way of reducing cumulative impacts. However, they realize that that approach is limited.

One area in which the subject of cumulative impacts comes up is nationwide permits where cumulative impacts cannot easily be observed, let alone controlled. Another area is where cumulative impacts are likely but the type of project being applied for is the same as several other already permitted projects. The question faced is how and where to draw the line. Not only does the Corps have no legal way of denying permits on the basis of possible future cumulative impacts when this project combined with other future projects, but the Corps of Engineers also often has limited environmental assessment data it could use in such an evaluation because of limited staffing of people who perform such work.

Enforcement. Manpower and tools utilized in permit processing were deemed to be adequate by both Districts providing that there are no changes in jurisdiction or policies, e.g., the 5 cfs rule (Creamer, Denmark, personal communication). Surveillance, however, could be strengthened, especially in the New York District. Philadelphia has three inspectors assigned to New Jersey and New York has two. Philadelphia has monthly flights, over coastal and inland wetlands; they find the flights to be valuable for monitoring and

surveillance, but where they are not flying there are very few permit applications. This could be due to a lack of activity as the Corps suggested (Denmark, personal communication) or because the Corps is not being provided with an opportunity to determine jurisdiction (i.e. developers are not notifying the Corps of Engineers of their projects). Public awareness of Federal and State wetland regulatory programs is good where the agencies maintain a high profile, and minimal elsewhere. The Philadelphia Corps of Engineers concentrates its surveillance efforts in Coastal wetlands and along the Mullica and Great Egg Harbor Rivers; this leaves hundreds of square miles in South Jersey that are not monitored closely by the Corps of Engineers. A major portion of the region, however, falls under the jurisdiction of the Pinelands Commission, and many conditions of its Management Plan regarding filling and encroachment on wetlands are more stringent than Section 404.

In North Jersey, outside the Passaic Basin, it is difficult to determine how much protection wetlands receive from 404. The New York Corps of Engineers does not conduct aerial surveillance and has limited monitoring on the ground; therefore, illegal fills may be more widespread than suggested by the Corps of Engineers. Certainly this is true in the Hackensack Meadowlands area where dead-end roads enable "midnight dumping" (Creamer, personal communication). (The HMDC claims to conduct their own surveillance for such activity and claims it to be effective.)

One approach that the New York Corps of Engineers uses to prioritize site inspections during the review of a permit application is that their permit writers tag certain permits for inspection personnel. Permits tagged are those that the reviewer has a concern for either because of the sensitive nature of the project or because of a concern about the applicant.

Information regarding the source of violation reports may provide insight into the effectiveness of surveillance programs in each District. The Philadelphia District (with aerial surveillance) indicated that 11 percent of the violations were reported by private individuals and the remainder by Corps of Engineers' investigators, other federal agencies and by State personnel (very few by CAFRA). In contrast, the New York District indicated that the public was the source for 90 percent of their reported violations. The discrepancy suggests that with more intensive surveillance, the New York District may find additional violations, assuming that public attitudes towards 404 are similar in both Districts.

The majority of violations have been reported from areas where the Philadelphia Corps of Engineers concentrates its surveillance efforts, i.e., east of the Garden State Parkway and on the barrier islands. When violations are discovered, both Districts issue cease and desist orders followed by one or more remedial measures. Usually the cease and desist orders are issued promptly, but in one recent incident in the Passaic Basin, there was a delay of several months (U.S. Fish and Wildlife Services, personal communication). Among recent Philadelphia violations, 66 percent are unresolved, 15 percent received after-the-fact permits, 14 percent restored wetlands voluntarily, and 5 percent of the cases were referred to the U.S. Attorney General for prosecution. Of the cases that go to the Attorney General, only about half are ever resolved. The other half, which are not resolved, consist mainly of cases where there is not enough evidence to convict, for example, the case of an absentee landowner who claims no knowledge of dumping on his land. According to the COE (Philadelphia District), personnel turnover in dealing

with violations has been a big problem. In addition to lack of evidence, many cases are left over from previous years, and current personnel are not familiar enough with them to get them resolved (John Olson, Philadelphia COE, personal communication). Similar figures were not provided by the New York Corps, except that six to seven percent of the individual permits issued are after-the-fact. The resolution of reported violations in New Jersey has been a problem for them (Creamer, Marrazzo, personal communication).

Evidently there is little flow of information about "illegals" between either the Philadelphia or New York Corps of Engineers and other Federal agencies. For example, the U.S. Fish and Wildlife Service indicated that they were rarely asked by the New York Corps of Engineers to comment on illegals located in inland freshwater wetlands and that freshwater acreage was being lost inspite of the 404 program. Nearly all of their official comments on illegal projects have been restricted to coastal projects in Monmouth County (to the south of and adjacent to Raritan Bay).

Both Districts can point to enforcement measures in freshwater wetlands, therefore it would be wrong to conclude that freshwater wetlands are being ignored. The Philadelphia Corps enforces the 404 program when illegals are identified. Enforcement in inland wetlands, however, tends to be much more passive as compared to coastal areas where both Districts maintain a "high profile."

The Corps of Engineers' enforcement efforts in New Jersey have been frustrated by the absence of administrative judges and enforcement officers who, in New York State and elsewhere, have the authority to handle 404

violations expeditiously. Even if the N.J. DEP had their own administrative law judges, Federal violations in freshwater wetlands could usually not be handled by the State because of the general lack of State laws covering freshwater wetlands. This leaves two choices: either the Corps of Engineers' in-house enforcement personnel, or the federal or state attorney general. Faced with a wide variety of other enforcement cases including drug enforcement and other cases involving public health and safety, the U.S. Attorney General apparently places prosecutions under the 404 Program very low on a list of priorities. The Philadelphia District has referred several cases where the state also has jurisdiction to N.J. DEP for prosecution by the State, but the State Attorney General has also been slow or reluctant to proceed.

Compensation and Restoration. Compensation for loss of wetlands or the restoration of damaged wetlands areas is an attempt to offset ecological damages. Both Districts now require "on-site," "in-kind" compensation, and generally at a ratio of 1:1; that is, one acre of marsh replaced for one acre lost. (An experimental quality compensation program is being considered that could be an adjunct to the 1:1 quality compensation requirement [see page 3-45]). Salt marsh cordgrass and other marsh types have been successfully established in New Jersey and elsewhere, but, in order for this to occur, the area to be restored must be properly prepared. The Philadelphia Corps of Engineers found that compensation/ restoration projects are most likely to succeed when a specific plan is stipulated which details elevations, soils, and plant densities together with standards by which "success" can be measured.

For most projects, the Philadelphia Corps of Engineers insists in 85 percent survival of plants, sometimes for an indefinite period, but more often for one growing season. In one instance they required that a company post a performance bond in order to ensure complicance with an order to replace wetlands in compensation for an illegal fill. Another technique they use to ensure compliance is to require that site preparation (in an area slated for restoration) be completed prior to or concurrent with construction of facilities for which the applicant desires a permit.

Both Districts work with applicants, usually in a project review capacity, to ensure that mitigation proposals are adequate. There are no rigorous guidelines, although 1:1 "in kind" mitigation is usually insisted upon. Technical assistance that the Corps provides usually is in the form of criteria or standards which the applicant must meet. They do no project design work nor do they normally identify mitigation sites.

However, in spite of this effort, many projects are not entirely successful. There are at least three reasons for this. First, monitoring and follow-up of the investigation measures is not always adequate. If projects are monitored at all, it is usually done by Corps of Engineers' inspectors who are not biologists (although, for the Philadelphia District, the Chief of Surveillance is a biologist). Second, proper grading and elevations sometimes are not achieved. In some instances this is because sufficient care was not taken to determine optimum elevations and in other instances, the work of the bulldozer operators was not adquately supervised. In at least one instance, proper grading was not achieved because of the nature of contractural arrangements: the consultant responsible for the

actual planting of vegetation had no direct control over the construction company contracted to grade the site.

A third reason why some restoration projects are not completely successful has to do with the attitude of the applicant. Time and personnel limitations restrict the amount of effort than can be devoted to a project, therefore, in some instances the Corps seems to have had to accept whatever effort the applicant puts forth. This has been adequate when the applicant has had a positive attitude and was willing to seek qualified professional help and spend the money necessary to implement a good restoration plan, but frequently applicants have been decidedly uncooperative when motivated by practical economics and interested in minimizing costs. Thus, public projects, such as the Bader Field runway extension and Atlantic County Sewerage Authority's conveyor system have been more successful than several private projects such as Harrah's Casino. In fairness to both the applicants and the Corps, mitigation is often very expensive. For example, the plan for the Atlantic County Sewage Authority which involved about 14 acres cost $146,000 to implement For example, the plan for the Atlantic County Sewage Authority which involved about 14 acres cost $146,000 to implement. Many would argue that an acre of wetlands with a current market value of $500 or less (e.g., in Barnegat Bay) is not worth ten thousand dollars to create. Cost, however, usually is not an overriding issue (Denmark, personal communication). Evidently this is because of an adverse legal position of the applicant or because the cost of compensation is incorporated into the overall development cost for commercial or industrial projects.

Obviously there is no simple answer to the question of whether or not applicants are paying too much for benefits accrued. It is important to

point out that many restoration and mitigation projects cost much less than $10,000 per acre to implement and yet satisfy the Corps requirements.

Restoration and compensation efforts have not been applied as frequently in freshwater wetlands as in saltwater areas. There are at least three reasons for this. First there are fewer projects requiring a 404 permit located in freshwater wetlands; second, the technology for restoring salt marsh is better developed than it is for freshwater marshes; third, freshwater marsh communities are diverse and many of the plant species are difficult to obtain commercially. There is, however, one project near Camden, which evidently has been successful in terms of the establishment of a freshwater plant community, but whether the project is successful in its intended purpose (1:1 compensation for illegal fill activities) is another matter.

Both Districts usually issue permits with a condition that before construction is started, any required mitigation plans must be detailed and approved by a Corps of Engineers' engineer. However, the permit is actually issued to the applicant before the plan is approved. The Fish and Wildlife Service prefers that the Corps of Engineers withhold the permit until the plan is approved as an incentive for the applicant to adequately complete the plan.

With respect to the New York Corps of Engineers, the American Littoral Society claims that the Corps does not use mitigation or compensation as a last resort in the permit process. The ALS claims that the Corps should first reduce the environmental damage of the project as much as possible through size reduction and design changes and only then allow mitigation or

compensation for the residual environmental damage. The New York Corps of Engineers states that that is the very approach they do use, and that they have such a negative image because that practice may have happened in the past, because they have so few denials, and because of certain controversial projects where permits have been awarded for non-water dependent projects on the basis of no reasonable or practicable alternatives. The Corps pointed to a recent case involving a number of townhouses in the Passaic River Basin. Under the permit, eight wetland acres will be lost while 15 created wetland acres will be required as compensation. Before this was agreed to, the New York Corps of Engineers required the applicant to study all possible alternate sites of a similar size within 5 miles of the proposed project (alternate sites do not need to be on property owned by the applicant). For various reasons, the applicant ruled out all alternate sites. The Corps of Engineers agreed after conducting their own verification process. The reasons cited were unfavorable zoning, inability to market the expensive townhouses, sewer bans, unavailability of the land, and large incremental developmental costs.

In summary, the 404 program has played an important role in wetland protection in New Jersey, especially in coastal areas, parts of which are under active surveillance. The 5 cfs policy limits the effectiveness of 404 in inland wetlands, probably more in practice than in theory, at least in the Philadelphia District, because the Corps there only makes determinations of jurisdiction on information received from applicants when an application has been submitted. If developers are unaware of 404, or the developers are unaware of the existence of wetlands on the site, there is little likelihood

of the Corps of Engineers becoming involved unless the project is located in an area closely monitored by them.

The biggest problem in implementing 404 seems to be following up on illegal activities and monitoring conditions. There is no good mechanism in New Jersey to handle legal cases expeditiously, and as a result, the vast majority of cases are unresolved.

Both Districts entertain proposals for compensation and mitigation, including marsh creation. A few projects are successful as measured by appearance (stem densities), but many are not. Degraded marsh habitats can be improved by grading and proper planting, but as a tradeoff for filling previously undisturbed wetlands, restoration projects usually do not achieve what has been lost from an ecological standpoint.

We were not able to substantiate any real differences between the two Corps Districts. However, in talking with personnel from both Districts, and in talking with individuals representing other agencies and environmental groups, we were given the impression that the New York Corps of Engineers chooses to interpret certain aspects of 404 in such a manner that some wetlands they permitted to be filled would be protected under the Philadelphia District. Interpretation of the 5 cfs guideline is one example: for the New York District, the 5 cfs guideline is a rule; while the fact that developers in the Atlantic City area are generally staying out of headwaters wetlands suggests that the Philadelphia Corps at least conveys the image to developers that discretionary jurisdiction is a possibility.

Surveillance is another area in which the Philadelphia District seems to have been more effective in implementing 404 than the New York District.

The monthly overflights have helped the Philadelphia Corps to find violators as well as monitor construction progress including compliance with conditions.

Floodplain Protection - Freshwater Wetlands

In New Jersey there is only one law which could protect freshwater or inland wetlands on a statewide basis: the Flood Hazards Area Control Act of 1972 which is closely related to the Federal flood insurance program. (It was preceded by and absorbed the 1929 New Jersey Stream Encroachment Act.)

However, its focus is strictly limited to the floodplain context. "Wetlands" by any definition are not a specific matter of concern, though of course many wetlands fall under its jurisdiction. In accordance with the National Flood Insurance Program, the New Jersey program identifies a floodplain in terms of a 100-year flood, divided into the core floodway where construction is limited to such things as bridges, sewer crossings, parking lots, and parks and the flood fringe where almost all activities are allowed including fill and the construction of buildings (with certain restrictions).

There are a number of things to be noted with respect to the protection of wetlands under this Act. By law, all the flood plains were to have been inventoried and the maps published if not by the State then by municipalities. However, only a small percent of the total flowing miles have been mapped, and at considerable cost. A large percent of the streams will probably never be mapped by the State because they are considered to be

too small; as a matter of policy, though not law, State jurisdiction is not claimed for watersheds smaller than 50 acres. In addition, the State staff was sensitive to political resistance to having maps published; property owners with land within the flood plain were understood to be unwilling to have the maps published for fear that their property values would decrease. As a result of not having the maps prepared, it will be harder in the future to spot illegal incursions into floodplains, and therefore into many wetlands.

Secondly, even if the floodplains in all the streams were mapped, the program would not protect all freshwater wetlands. There are many upland seeps or drainage paths at the bottom of hills which do not flow and would not be protected. And, even on well-mapped streams, there are wetlands that are not covered because the legal range of the program is strictly limited to the technically-defined floodplain. There are no definitions involving vegetation or types of soil by which jurisdiction could be extended beyond the floodplains. No matter how obvious a wetland is and even if it is directly adjacent to a floodplain, if it is outside the delineated floodplain boundaries, permits are not required for activities there; if jurisdiction were attempted, it would probably be defeated in the courts. According to Mr. Ahuja of the Division of Water Resources, who has long been actively involved with the State floodplain programs, about 1 in every 5 permits involves a wetland which extends beyond the floodplain boundaries.

At one time, the program had a policy of refusing to allow people to fill in the floodplain, especially the fringe area, unless an equivalent and properly excavated area was provided elsewhere. However, the courts said that the program did not have the legal right to make such requirements and,

as a result, in 1978, of 500 applications submitted for flood plain projects, 450 were approved.

There is an additional problem with trying to control development in the flood fringe for environmental purposes; namely, regulations for the fringe have never been subjected to the entire hearing and review process and have never been officially adopted. This contributes to the problem the staff has in trying to get their attorneys to press a case on environmental issues.

Environmentalists feel strongly that, in addition to the major limitations of the program in terms of wetland protection, the regulations are particularly remiss in not addressing the cumulative affects of development (including the sealing of the floodway by parking lots, for example) on flooding, not to mention on the environment. When asked about the sealing of a wetland in a flood plain and whether or not it would affect flooding downstream, the response of the program staff was, "not really". But when pushed to pursue the logic of that reasoning with a question about the affect of sealing the entire flood plain, they of course acknowledged that it would have a significant effect. However, because of their focus on ensuring "good engineering practices" for those individual projects in front of them now, or their professional training (usually as engineers), or the lack of official guidance (through regulations) which would deal with broader effects and solutions, they seemed incapable of taking what might be called a "holistic" or longterm approach to floodplain management.

The regulations for the floodplain program are now under review and the cumulative effects of development is one of the specific issues being addressed. One way that is being considered to reduce the cumulative

impact of development is to stipulate that only a certain percent of a reach of stream can be sealed. The percent has not been agreed upon and there is also in-house controversy about the definition of a "reach of stream". Does it mean that the percent is to be applied to each permit, or to a specified distance or jurisdiction of a stream? And what about reaches where no development or sealing should be allowed? Would this be a general approval for a percent of sealing?

Despite the fact that the floodplain program is generally of little help in the active protection of wetlands, there are two cases where the program is now being used for environmental purposes: on those stream portions which the State Fish, Game and Wildlife program has designated as able to maintain or produce trout, and on designated Wild and Scenic Rivers. When such an area is threatened, the floodplain program has accepted responsibility for the area's protection by denying permits. But in the case of the trout stream for example, the protection is for particular uses of the stream not for expanses of wetlands. Therefore, other wetlands in the watershed could be filled without the program being involved.

CAFRA - Freshwater Wetlands

Freshwater wetlands near the ocean shores and bays of New Jersey are protected under the Coastal Area Facility Review Act program (CAFRA) which is part of a Federally approved coastal zone management program.

The law, passed in 1973, limited the CAFRA jurisdiction to areas along the generally less-developed central part of the New Jersey coast; the

coastal areas around New York in the north and Philadelphia in the southwest were excluded. The inland boundary of CAFRA was also specified in the law, using roads as the perimeter rather than physical characteristics such as watersheds. As seen on the map (Figure 3 above), the band of land under its jurisdiction is very narrow in some places and broad in others.

The policies developed for the implementation of the Act cover the entire CAFRA area. However, there were two pre-existing permit programs within the area. The Waterfront Development Act permit covered all development along the waterfront of navigable waterways in New Jersey except for activities in those tidal wetlands which were covered by Wetland Act permits. These three permit programs still exist, but they are administered by the same people and are guided by the same policies. The CAFRA permit area is therefore limited within the overall geographic jurisdiction to activities on all non-tidal waters and wetlands as well as all upland developments. Between 50 and 75 thousand acres of freshwater wetlands are included in the CAFRA area.

The intent of the law was to serve a wide variety of primarily environmental purposes. In order for a permit to be issued under this Act, the New Jersey Department of Environmental Protection must agree that it:

(a) Conforms with all applicable, air, water, and radiation emission and effluent standards and with all applicable water quality criteria and air quality standards.

(b) Prevents air emissions and water effluents in excess of the existing dilution, assimilative, and recovery capacities of the air and water environments at the site and within the surrounding region.

(c) Provides for the handling and disposal of litter, trash, and refuse in such a manner as to minimize adverse environmental effects and the threat to the public health, safety and welfare.

(d) Would result in minimal feasible impairment of the regenerative capacity of water aquifers or other ground or surface water supplies.

(e) Would cause minimal feasible interference with the natural functioning of plant, animal, fish, and human life processes at the site and within the surrounding region.

(f) Is located or constructed so as to neither endanger human life or property nor otherwise impair the public health, safety, and welfare.

(g) Would result in minimal practicable degradation of unique or irreplaceable land types, historical or archeological areas, and existing scenic and aesthetic attributes at the site and within the surrounding region.

Because the law included a mandate that the program provide for public welfare, etc., the implementation of the law was designed as a vast regional master land use plan, taking a wide variety of public welfare factors into account. These range from national issues of energy availability to local cries for the restoration of blighted cities or for the development of vast tracts of houses, as well as the mandates of the various environmental laws. CAFRA public relations material announces that "the Act was intended to preserve environmentally sensitive sites and ensure a rational pattern of development" and that

Since New Jersey is the most densely populated state in the nation, there are enormous pressures on its coastal zone to accomodate development while preserving the natural beauty of the shore and estuary systems. In light of these competing interests, the Division of Coastal Resources in the New Jersey Department of Environmental Protection (DEP) designed a coastal management program to:

- protect and enhance the coastal ecosystem
- concentrate rather than disperse the pattern of coastal residential, commercial, industrial, and resort development and encourage the preservation of open space
- employ a method for decision-making which allows each coastal location to be evaluated in terms of both the advantages and the disadvantages it offers for development
- protect the health, safety and welfare of people who reside, work and visit in the coastal zone
- promote public access to the waterfront through linear walkways and at least one waterfront park in each waterfront municipality
- maintain active port and industrial facilities, and provide for necessary expansion in adjacent sites
- maintain and upgrade existing energy facilities, and site additional energy facilities determined to be needed by the N.J. Department of Energy in a manner consistent with the policies of this Coastal Management Program
- encourage residential, commercial, and recreational mixed-use redevelopment of the developed waterfront."

Within the broadly interpreted topics of concern are "Special Areas" for which specific policies and rationales have been developed. When a Special Area is involved in a permit, the policies automatically apply (subject to interpretation, of course). The Special Areas are nearly all of environmental value. (One strikingly different type of Special Area is

"Special Urban Areas" which are those cities needing help to restore their economic and social viability.) The Special Area of interest to freshwater wetlands include Wetlands, Intermittent Stream Corridors, Endangered or Threatened Wildlife or Vegetation Species Habitat, and Critical Wildlife Habitats. The policy for Wetlands in particular is:

(a) Definition

Wetlands are areas where the substrate is inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions which are subject to the Wetlands Act, or the Coastal Area Facility Review Act (CAFRA) or the Waterfront Development Law...

Under CAFRA, DEP regulates freshwater wetlands and forested wetlands such as white cedars on sites proposed for the major developments requiring a CAFRA permit...

(b) Policy

1. In general, development of all kinds is prohibited in wetlands, unless DEP can find the proposed development meets and follows the four conditions:

(i) Requires water access or is water oriented as a central purpose of the basic function of the activity (this policy applies only to development proposed on or adjacent to waterways),

NOTE: This means that the use must be water dependent as defined.

(ii) Has no prudent or feasible alternative on a non-wetland site,

(iii) Will result in minimum feasible alteration or impairment of natural tidal circulation (or natural circulation in the case of non-tidal wetlands), and

(iv) Will result in minimum feasible alteration or impairment of natural contour or the natural vegetation of the wetlands.

2. In particular, dumping solid or liquid wastes

and applying or storing certain pesticides on wetlands are prohibited.

3. Both the restoration of degraded wetlands as a mitigation measure for certain types of approved wetlands development and the creation of new wetlands in non-sensitive areas are encouraged. The Division of Coastal Resources previously has required restoration of temporarily disturbed wetlands and will continue to do so on a case-by-case basis...

5. Development that adversely affects white cedar stands is prohibited.

(c) Rationale

The environmental values, and fragility of coastal wetlands have been officially recognized in New Jersey since the passage of the Wetlands Act of 1970. Coastal wetlands are the most environmentally valuable land areas within the coastal zone.

Coastal wetlands contribute to the physical stability of the coastal zone by serving as: (i) a transitional area between forces of the open sea and upland areas that absorb and dissipate wind-driven storm waves and storm surges, (ii) a flood water storage area, and, (iii) a sediment and pollution trap.

Also, wetlands naturally perform the wastewater treatment process of removing phosphorous and nitrogenous water pollutants, unless the wetlands are stressed.

The biological productivity of New Jersey's coastal wetlands is enormous and critical to the function of estuarine and marine ecosystems. The emergent cord grasses and associated algal mats convert inorganic nutrients into organic plant material through the process of photosynthesis. In this way, the primary base for estuarine and marine food webs is provided. The principal direct dietary beneficiaries of organic wetland detritus are bacteria and protozoa, which are in turn fed upon by larger invertebrates. Important finfish, shellfish, waterfowl, and other resources feed

upon these invertebrates. New Jersey's Coastal Wetlands are prime wintering habitat annually for hundreds of thousands of migratory waterfowl. Approximately two-thirds of marine finfish and shell fish are known to be estuarine, and, therefore, water-dependent. Inland herbaceous wetlands, such as bogs, play an important role in regulating the quality of water in streams that flow to estuaries. They retard runoff and store storm waters. They are important areas of primary productivity for estuarine systems. They are critical habitats for several species of plants and animals that are endangered or threatened. They are productive habitats for other game and non-game animals, such as deer. These wetlands also serve as fire breaks, and may limit the spread of forest, brush, or grass fires. They are inappropriate development sites due to poor drainage and load bearing capacity of the underlying soils.

Forested Wetlands play a critical role in coastal ecosystems. Roots and trunks stabilize shorelines and trap sediment. They are physical and biochemical water filter areas maintaining tidal stream water quality. They provide primary protection to estuarine areas from decaying plant materials flushed down by streams. They are critical habitats, breeding areas and movement corridors for many coastal species including rare and endangered species. High productivity, high water availability and high edge to area ratio make these areas especially productive wildlife areas.

White cedar stands, as well as other lowland swamp forests, play an important role in purifying water in coastal streams, retarding runoff, providing scenic value, and serving as a rich habitat for many an endangered plant and animal species, as well as game species, such as deer. White cedars also act as forest fire breaks. White cedar stands most commonly occur in flood plains and in the fringe areas of drainage deposits. This material is particulaly unsuited for development unless highly altered.

White cedar is New Jersey's most valuable timber species and grows in discrete stands. The wood has a long tradition of maritime and local craft uses. Unfortunately, white cedars have been eliminated from much of their previous range in New Jersey.

This overall approach is very close to the Corps of Engineers approach to wetlands, with one striking exception. CAFRA has no lower limit in terms of the acres or flow of a wetland that it will consider. It accepts jurisdiction of all freshwater wetlands above and below 5 cfs flow and as small as an acre or even less. Another difference in their approaches is that, if there is a minor cluster of a wetland type of vegetation at a small distance removed from an obvious wetland area, the Corps is more likely to incorporate it in the wetland over which it is taking jurisdiction. The State makes a less generous interpretation of whether or not there is a "prevalence" of a particular kind of vegetation.

As usual with the implementation of any large program, the specific person who is making the "front line" interpretations and decisions is crucial to the effectiveness of the program. One example of differing interpretations within the CAFRA program has to do with the policy that there is "no prudent or feasible alternative on a non-wetland site." One regional director, responsible for preparing CAFRA permit approvals or denials, regularly interpreted that to mean that alternative locations had to be on land already owned by the applicant. If the one piece of land under question was all he owned, then he had no alternative location and that aspect of the policy would have been satisfied. However, the permit review office director said equally firmly that the policy meant that CAFRA was to consider whether there was any other place in the general extended area, no matter who owned it, which could serve the same need and purpose but with less environmental damage.

Although the policies of the Corps and CAFRA are very similar and although CAFRA has no lower hydrologic or watershed size limitation for its

jurisdiction over freshwater wetlands, CAFRA by law covers only "major" developments. Those activities which do not require CAFRA permits include housing developments of fewer than 25 units, commercial and other establishments with fewer than 300 parking spaces, and certain extensions of municipal services, such as the extension of roads and sewer lines by less than 1200 feet. The exclusion of 25-unit or less housing developments and 300-space or less shopping centers from any control by CAFRA can have serious consequences for the freshwater wetlands. For example, an application for a shopping center with 300 parking spaces was received by CAFRA. CAFRA explained that since that would involve filling in a fairly substantial bog, a CAFRA permit would not be granted. CAFRA, however, suggested that the same objective could be achieved by shifting the shopping center and its parking area on the land already owned by the developer. The developer would have none of these changes, reduced the number of parking spaces by one, and filled in the bog. No 404 permit was required because the flow was less than 5 cfs.

However, this is the exception rather than the rule. Nearly all of the CAFRA area is above the Corps' 5 cfs limit of jurisdiction. Therefore, projects falling below the State's "25/300" limitations would fall into Corps 404 jurisdiction. (The State DEP legal office has also agreed with Washington that, despite the "Federal consistency" portion of the Coastal Zone Management program, a project which has been approved by CAFRA can be approved or denied by the Corps.)

(The question of who has the higher authority with respect to environmental issues is also an important question between the State and the municipalities within the CAFRA area, particularly because New Jersey is a vigorously "home rule" state. The courts have maintained that, although the

municipalities have basic zoning powers, the State has not relinquished its "police powers" with respect to environmental protection. Therefore preliminary approvals granted to a project by a municipality can be denied by CAFRA.)

The effect of the CAFRA program on protecting wetlands has been excellent. Since the law was passed, gross filling of wetlands falling under CAFRA or 404 jurisdiction has ceased, although in the early days (1973 to 1978), roads and fairly generous filling along the margins of freshwater wetlands was often permitted. Since the policies have been in place (1978), essentially no wetlands have been filled. On maybe only 5-10% of the CAFRA applications, only minor encroachments are permitted. The CAFRA program is well publicized and known to be firm about wetlands. As a result, a number (though not all) of the developers now come to CAFRA asking to be told how to deal with their wetlands and appropriate buffers so that they can comply with CAFRA policies and not require a permit.

The CAFRA staff in general are complementary about the contributions and support by the Corps, as well as the federal Fish and Wildlife Services in the permitting process.

In addition to being a well-known program, CAFRA is also well enforced, at least at the present level of the economy and the reduced pressures for development. The budgets and staff have been increased over time, and the staff now includes more professionals than technicians doing essentially bulkhead inspections.

There are of course those proposed "minor" developments affecting wetlands over which CAFRA has no jurisdiction (and no statistics). Minor developments, which are built on upland areas and over which CAFRA has no

control, have no direct affect on wetland acreage now (though they may have an affect on water quality). However, it is possible that they may create future pressures on wetland acreages. The CAFRA land use plan is based to a large extent on densities of development; if an area is already a high density area, environmental considerations are less heavily weighted when tradeoffs are being considered prior to approving or denying a permit. If indiscriminate and "leap frogging" "small" development is allowed, designations of low and moderate growth areas may be changed to higher categories. Under those conditions, it may be harder and harder to keep strong a commitment to environmental goals in the face of other pressing issues of concern to CAFRA. A shift by top program management away from environmental goals is already troubling to a number of the CAFRA staff who see that the single social welfare objective in the law (see paragraph (f) on page 3-25 above) is beginning to override the six environmental goals in the law. For example, in one case, though not a wetlands case, it was decided at the highest level that the need for low and moderate income housing in the Atlantic City area overrode the firm recommendations by the staff that the permit be denied on environmental grounds.

This points up a major potential problem for the protection of the freshwater wetlands in the CAFRA area, namely that the state agency (the Department of Environmental Protection) which is the only body in the state government which can take an advocacy position on long- and short-term environmental issues is also responsible for regional planning involving economic, transportation, energy, and many other local, regional, statewide, and national issues. (It is perhaps of no consequence other than interest, but the CAFRA and other top administration offices of the Department of

Environmental Protection are in the Labor and Industry department building, and are on the same floor as the Economic Development Authority.) Compromises can inevitably creep into permit decisions. They may also appear in ammendments to the polcicies, some of which are made administratively and some of which are the result of public hearing process. It may also be increasingly, as well as continually, difficult to resist the efforts of lobbying groups such as the Shorebuilders Association which are well financed by casino interests among others.

Nonetheless, it is true that under present political conditions with a willingness to support environmental programs with adequate budgets and vigor, this program has had a very important effect on the protection of freshwater wetlands under its judisdiction.

Wild and Scenic Rivers

The purpose of the Wild and Scenic Rivers Act of 1977 is to preserve, protect and enhance the natural and recreational value of some of the State's most significant river segments. The Act allows the Commissioner of DEP to designate river segments as "wild", "scenic", "recreational", or "developed recreational". In any river segment so designated, all construction activities would be either prohibited or regulated but only within the river's flood hazard area. This is because the geographic extent of the program's jurisdiction is essentially the flood hazard area (except for DEP-owned lands beyond the flood hazard area which are important to the river; these may also be included in the designated river area). A designation study, assessing

the river's values, and the impact of designation must be prepared and is subject to public review and hearings. To date, only 14 miles along the Mullica River in the Pinelands has been incorporated into the system and very little of its floodplain includes wetlands.

Watershed Associations and Local Environmental Commissions

Though not under State laws, there is an important general category of programs scattered throughout the state which are specifically concerned with the protection of freshwater wetlands, namely local Watershed Associations.

One of the primary activities of some of these Watershed Associations is to provide detailed natural resource inventories of each municipality within an entire watershed, often using Department of Agriculture soils maps as a basis over which overlay maps are constructed to present various resource conditions.

These inventories provide a factual base on which decisions can be made by local zoning boards. The members of these boards are certainly not always insensitive to environmental issues, but many are unclear about how to draw up environmentally meaningful zoning ordinances. The members often do not know exactly where and why to set particular zoning boundaries and what types of codes and ordinances are appropriate from an environmental point of view to replace which inappropriate ones. A New Jersey publication called the Protection of Inland Wetlands provides guidelines for local laws. However if responsibility for wetlands, is to be passed back to the local level, a tremendous information/education gap must be filled. Zoning boards need

facts about the local area as well as environmental theory and the support of professionals at established watershed associations to begin to marshall a position in opposition to developers and local pressures. For a lay group which meets only once a month, it is crucial to have a professional available to graphically present the environmental position. In some cases, the person may also be able to persuade the planners that if wetlands and other environmental features had been protected in the first place, subsequent damage might not have occured.

Municipal Environmental Commissions are part of the local administrative structure and are, or course, quite different from Watershed Associations. However, in some municipalities Environmental Commissions do play this information providing role, but since the authority of New Jersey's Environmental Commissions is very limited, they are ignored as ineffective in many situations.

Wetlands Act - Tidal Wetlands

Wetlands that are influenced by tides (including both saline and freshwater wetlands) are protected by New Jersey's Wetlands Act of 1970 which requires a permit "prior to the dredging, removing, filling or otherwise altering or polluting coastal wetlands." The geographic jurisdiction of this program does not cover all tidal wetlands along the Hudson River, but it covers those south of the Raritan Bay along the ocean coast, and around and up the Delaware River past Philadelphia to the Trenton head-of-tide.

Its vehicle for protection is a permit and the detailed policies under which the program operates are the same as those under which CAFRA permits are decided for freshwater wetlands. As discussed above, these policies are similar to the Corps policies.

The activities for which permits are required include any draining, dredging, excavation, or construction of buildings or pilings; they exclude the commercial production of salt hay. This is significantly broader coverage than under CAFRA legislation where jurisdiction is limited to "major" activities.

Because it shares the policies of CAFRA, it also shares the problems outlined above in the CAFRA section. For example, because of the social welfare component of the overall policies, one of the policies of considerable interest to those evaluating Wetland Act permit requests is the accessibility of the coast to the local (and other) population. "Access", "recreation" are often more commonly heard words than "protection", especially when the wetlands being considered are of small extent and considerably degraded.

However, despite its similarities with the CAFRA policies and therefore with the Corps of Engineers, there are two significant distinctions between Corps and Wetland Act with respect to definitions of wetlands and therefore jurisdiction. The Wetlands Act itself specifies that the program shall only include areas containing one or more of 19 species, all of which are grasses except hightide bush, Iva frutescens oraria. Only tidal marshes are therefore included; no areas are included with woody wetland vegetation such as certain shrubs and trees which are characteristic of tidal swamps.

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Areas containing even a small stand of such shrubs or trees are outlined on maps as being outside the jurisdiction of the Wetlands Act. This represents a substantial difference from the Corps approach, one that is experienced by the Wetlands Act review staff nearly every time they do a joint site inspection with the Corps. The Corps nearly always claims considerably greater jurisdiction than the State under the Wetlands Act. (In those parts of the coast where CAFRA jurisdiction applies inland from Wetlands Act areas, the CAFRA wetland policies apply to shrubbed and wooded wetland areas.)

Another, though somewhat less dramatic difference between the two programs, is that the Wetlands Act required that the tidal wetlands be inventoried by means of aerial photographs. On the basis of those photographs which were taken in 1972, wetlands were to be delineated on maps which were then to be promulgated. Since then, the officially accepted maps indicate the entire jurisdiction of the Wetlands Act. By law, the species or other characteristics of an area no longer are to be considered. If an area is on the map, it is a wetland; if it is not, it is not a wetland under the State law. The Corps, of course, is under no such constraint. The present conditions in the field are what matter.*

The effect on the protection of the approximately 275 thousand acres of tidal wetlands by the Wetlands Act must be assessed in terms of its own species-specific definition of wetlands. And in those terms it is generally

*Tidal wetlands which slip through the Wetlands Act conditions may however be protected under the State's Waterfront Development Act which grants permits for activities up to 500 feet of the mean high water, using CAFRA's policies for wetlands

agreed to be a success especially since 1978. David Kinsey, until recently the Chief of the Division of Coastal Resources, says that prior to 1974, tidal wetlands were destroyed at a rate of 1,500 acres a year. Since then, only 417 acres have been destroyed. And in 1978, not only were the CAFRA/ Wetland Act policies established, but the staffs which implemented the two programs were unified. This not only ensured a uniformity in the implementation of the policies, but it also brought the willing but fairly untrained Wetlands program staff under the direction of Coastal Project Review Bureau whose staff had more advanced professional training in environmental disciplines.

Green Acres Funding

The Green Acres Administration determines where and how state funds should be spent for park and open space acquisition, development, and capital improvements.

The State Comprehensive Outdoor Recreation Plan (SCORP), prepared by the Green Acres Administration, addresses the adequacy of open space for existing and projected demands, and the accessibility of recreation resources for all segments of the population. The plan qualifies New Jersey for funding under the Federal Land and Water Use Conservation Fund Program. However, from a wetlands preservation point of view, it should be noted that the major policies in SCORP also proposed for adoption in the Coastal Management Program, include an emphasis on open space in urban areas, recreation facility development, increasing public access to recreation resources

through mass transit, and developing barrier free recreation facilities. Thus not much wetlands protection occurs under this program.

Five hundred forty million dollars has been approved by the voters for Green Acres funding since 1961. Some of the money is used for direct State acquisition, while the majority is channeled through local governments as matching grants.

Natural Areas System Act

The Natural Areas System Act calls for the Department to designate and regulate State-owned lands for the purpose of protecting and enhancing their natural values. The natural area regulations govern state agencies administering lands designated as part of the system, and ensure that any critical areas purchased by the State for preservation or conservation purposes are adequately protected. The number of wetlands acres within the system is not known.

Delaware River Basin Commission

The DRBC established in 1961 is the Nation's first Federal-Interstate commission dedicated to conservation and best utilization of water and related resources within a single major watershed. The commission was mandated by law to develop a comprehensive plan for the Delaware River basin. Since the plan's approval, all public and private projects which affect water resources within the basin must comply with the goals and policies of the comprehensive management plan.

In 1978, the DRBC adopted a wetlands protection policy. It states that:

> Encroachment on wetlands shall not be permitted unless such assessment shall establish that no feasible alternative exists and that overriding public interest has been demonstrated. Project encroachments having no alternatives and demonstrating an overriding public interest shall be planned, constructed and operated in a manner to safeguard the present and future public interest in the environmental values derived from such areas.

The program is coordinated with and a supplement to the New Jersey Coastal Wetland and the Corps of Engineers permitting programs. The commission will review any project which would affect a wetland greater than 25 acres. Those projects affecting smaller wetlands will be reviewed only (1) when they are of "major regional or interstate significance" and there is no state or federal jurisdiction, or (2) where the DRBC policy is not reflected in the decision of another state or federal agency.

The DRBC review process is begun at the request of one of the States in the Commission. To date, DRBC has not been asked to review any projects in New Jersey wetlands.

The Hackensack Meadowlands

The area under the jurisdiction of the Hackensack Meadowlands Development Commission (HMDC) comprises 19,730 acres or 31 square miles. The HMDC was created by State law in 1968 and has all zoning power for the 14 municipalities involved. Its mandate is to provide jobs and homes, perform solid waste management functions in perpetuity for municipalities that previ-

ously disposed in the the Meadowlands, and to protect the delicate balance of nature. The HMDC has a tax revenue-sharing formula by which all the municipalities share in new ratables, thus eliminating the competition among municipalities to attact such ratables to their own jurisdiction. To help accomplish its objectives, the HMDC has developed, and periodically amends, a Master Zoning Plan to control land use. The plan includes open space requirements for developed land, wildlife and park areas, transit corridors, and areas for residential, industrial, office, and transportation development.

Programs and Policies and Activity. The HMDC has been designated by New Jersey as the responsible agency for coastal zone management for the Meadowlands area. This designation was accepted by the Department of Commerce's NOAA.

On the other hand, the Meadowlands are exempt from the requirements of the New Jersey Wetlands Act. The formation of the HMDC preceded the New Jersey Wetlands Act by two years and the exemption recognized that the HMDC had a major task in cleaning up the Meadowlands area which had a dreadful reputation of being a blighted, smelly, deteriorating area. In pursuing this and its other objectives, the HMDC would and could approve some wetlands development which would not be allowed in the rest of New Jersey under the Wetlands Act.

The HMDC well understands its mandate to create jobs and homes and to protect the balance of nature. It feels that the accomplishment of the first objective may entail the elimination of some wetlands. However, on balance the HMDC feels that it has reversed the trends of wetland losses that occurred prior to the creation of the HMDC and has established a very creditable

environmental record. The environmental staff has conducted a number of studies over the past several years documenting improvements to the rivers and wetlands, and fish and wildlife trends. They have also been active in resource recovery research and other solid waste management activities.

During the ten years since development has been allowed by the HMDC, the residential population has grown from 5,735 in 1970 to 9,158 in 1980, a 60 percent increase. Much of this increase occurred in the clustered residential development of Harmon Cove. The amount of land developed during the past ten years on non-wetlands is somewhere between 700 and 1,000 acres and therefore slighlty exceeds the amount on filled wetlands.

Anyone wishing to undertake development in the Meadowlands must obtain a permit from the HMDC. As a requirement for a permit, the developer must have obtained a New Jersey Waterfront Development Act permit and evidence of the legal rights to develop the land. (The former is routine; the latter is sometimes complicated in New Jersey because the State claims ownership of now or formerly tidal lands. Proof must be provided by the developer that he has obtained a "riparian" grant, right or license from the State of New Jersey.) It is not necessary for the developer to have obtained a Section 404 permit from the Corps of Engineers prior to the HMDC issuing a permit.

The HMDC assigns part of the review of a project to its environmental staff. When wetland alteration or loss is involved that is not part of the Master Plan, the project is either rejected or, if it is of significant size, an amendment will be sought in the Master Plan.

With regard to dike restoration or repair, the Corps requires a permit if the dike has essentially been washed away and the area is otherwise returning to its natural state. If the dike is still functioning as a dike,

then the action would be conducted under the serviceable fills nationwide permit.

Controversies. The major issue in the context of the interaction of the HMDC permit process and the 404 program is how can nonwater-dependent filling of wetlands occur in the Hackensack Meadowlands? Several reasons why nonwater-dependent uses of wetlands occur in the Meadowlands appear to be: 1) the New York Corps of Engineers believes strongly in the effectiveness of mitigation, 2) the HMDC is politically powerful, 3) decisions were made by the Corps in the past that would not be made today, 4) "creative" permitting is often used, and 5) the environmental constituency partially accepts or is resigned to accept the mandates and environmental record of the HMDC.

The New York Corps of Engineers denies very few Section 404/10 permit applications (one last year) but they do alter or cause the altering of 80 percent of the permit applications. The alterations do not often require that the project be moved to nonwetland areas. Rather, they consist of some redesign and mitigation. The New York Corps of Engineers believes strongly in mitigation and that it can be appropriately applied in most situations. However, the office has not verified this belief through field inspections of the effectiveness of actual mitigative measures.

The second reason for the frequent approval of nonwater-dependent uses in the Hackensack Meadowlands is the political power of the HMDC. Many politicians in New Jersey have a strong interest in the success of the HMDC. This brings them to aid the HMDC in getting projects approved. This aid occurred directly in the case of the Sport Complex and involved HMDC, a U.S. Senator from New Jersey, and top officials in the U.S. Department of the

Army. It is indirectly influential in other projects that are proposed for the Meadowlands.

Several years ago, the New York Corps of Engineers did not require mitigation for Meadowlands projects such as the Sports Complex. Later, and in general, the New York Corps of Engineers required a 1:1 ratio of new to lost wetlands as the compensation plan by permit applicants. In the HMDC, it is difficult to achieve a 1:1 "quantity" compensation; therefore the New York Corps of Engineers is experimenting with a 1:1 "quality" compensation program. The first example of this may occur in a Hartz Mountain development called Harmon Meadows, an office, residental, and shopping complex. The mitigation plan consists of a freshwater impoundment that would be created to offset the filled saltwater wetlands. A panel of representatives from each of the various interest groups involved is rating the quality of the proposed created wetlands. The New York Corps of Engineers will evaluate their ratings and then decide whether or not the plan offers adequate mitigation or compensation. The Corps of Engineers has not yet specified the criteria they will use in making the decision.

The HMDC is withholding judgment on this approach to mitigation for this project because of the uncertainty of its effect on the developer and because the impoundment involves land that is otherwise designated to be used to create jobs or homes. The HMDC is very concerned that the mitigation plan might cause Hartz Mountain to decide that the expense is too significant and that the project could be withdrawn from the area.

According to the HMDC, most of the permit applications to the New York Corps of Engineers have involved protracted discussions about their non-water dependency but that ways are eventually found to approve the project. For

housing projects, the HMDC argues, but the Corps of Engineers does not accept, that the project is dependent on the residents having a view of the water. For a public school, the creative argument was made and accepted that proposed recreation fields of the school were in the public interest and theefore should be permitted. The New York Corps of Engineers has referred to the compelling public-interest clause and 'ack-of-alternate-sites clause in the 404 program for some non-water dependent projects.

Lastly, there does not appear to be a higly vocal local environmental coalition opposing the projects. Groups such as the New Jersey Audubon Society feel that "it is better to have half-a-loaf than none." They are generally pleased with the environmental turnaround of the Meadowlands since the creation of the HMDC. The groups do not ask the question, would the 404 program have been just as, or more, successful in stopping projects or dumping and would the water quality have improved anyway? The HMDC was present first and is associated with the improvements. However, the groups do continue to play a watchdog role with respect to HMDC decisions, including those that result in wetland losses, and they frequently offer testimony at public hearings.

In the event that the State of New Jersey was given full authority for wetlands management, it seems likely that less protection of wetlands would occur. The New York District Corps of Engineers provides a certain degree of additional protection to wetlands by requiring changes in the size and designs of some projects for wetland loss reduction purposes, in spite of the fact that they already have been permitted by the HMDC. One such project is Hartz Mountain's Harmon Meadows. Knowing that 404 is there also helps keep the HMDC from straying too far from the environmental component of its original mandate.

The Pinelands

The National Parks and Recreation Act in 1978 established the Pinelands National Reserve, totalling 1,080,000 acres in southern New Jersey, and it authorized the establishment of a planning entity responsible for developing a Comprehensive Management Plan for the Pinelands. In February 1979, Governor Byrne issued Executive Order 71, which both provided for the establishment of the Pinelands Planning Commission and imposed a moratorium on the granting of building permits, making most development within the Pinelands National Reserve subject to the Commission's approval during the planning period. In June of 1979, the N.J. Legislature passed the Pinelands Protection Act, which defined the boundaries of the Pinelands Area. The Pinelands Plan officially took effect in January of 1981.

The Commission's jurisdiction includes the 368,000-acre semiwilderness Preservation Area, and the 566,000-acre Protection Area which is slightly more developed (Figure 13), and much of the rest. An additional 146,000 acres is included of the Pinelands National Reserve (46,000 acres). The balance is either military reservation (Fort Dix/McGuire AFB) or regulated by CAFRA. The Commission's regulatory efforts are focused on the Preservation and Protection Area.

It is estimated that there are 270,000 acres of inland wetlands (about 15-20% of the Pinelands National Reserve) and 5,000 acres of coastal wetlands in the Pinelands. The Pinelands Commission's definition of coastal wetlands (which is consistent with the Corps of Engineers definition) includes coastal marshes, meadows, swamps, and mud flats, and inland wetlands include Atlantic white cedar swamps, hardwood swamps, pitch pine lowlands (which make up 40%

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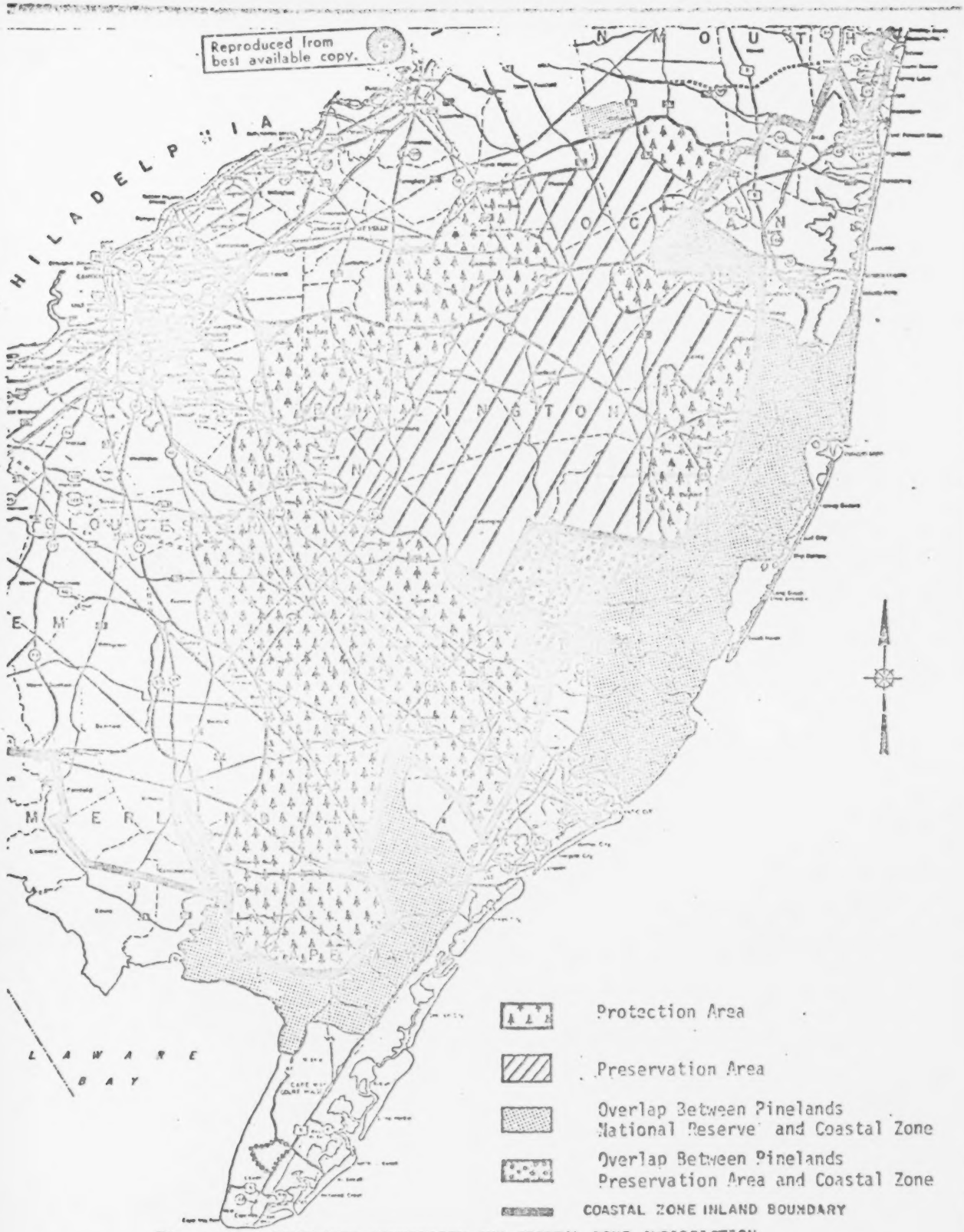

Figure 13. PINELANDS COMMISSION AND COASTAL ZONE JURISDICTION

of the inland wetlands), bogs, inland marshes, lakes, ponds, streams, and rivers. Wetland criteria are based on vegetation and depth to seasonal high water table.

The Pinelands Plan affords protection to wetlands in three ways: by prescribing housing densities; by prohibiting development in and around wetlands; and by acquisition. Although not explicitly stated, the Plan functions as a zoning instrument. In the core Preservation Area, virtually no building is permitted. The rest of the Pinelands National Reserve, including the Protection Area, is divided into low, medium and high growth areas by land use categories. In low growth areas, an average maximum density of 1 dwelling unit/23 acres is permitted, while in high growth areas, local plans provide for residential zoning districts with densities from less than .5 units/acre to greater than 12 units/acre.

Article 6 in the Pinelands Plan sets forth stringent measures for preserving and protecting wetlands: non-water dependent activities are prohibited; the principal activities permitted include berry agriculture, approved forestry activities, and low-intensity recreational uses such as hiking, canoeing and hunting. Water-dependent recreational facilities are permitted with provisions, and public facilities such as roads, bridges and transmission lines are permitted under some conditions, again with provisions to minimize adverse impacts. Residential, commercial, industrial, and institutional development is not permitted either on wetlands or within a 300-foot buffer zone surrounding them (Pinelands Commission, 1980, page 223). The only exceptions granted are for extraordinary hardship, demonstrated public need, or if the applicant can demonstrate that the activity in the wetlands or their buffer zone will avoid significant adverse impacts as

defined by nine separate criteria in the Pinelands Plan.

> A significant adverse impact shall be deemed to exist where it is determined that one or more of the following modifications of a wetland will have an irreversible effect on the ecological integrity of the wetland and its biotic components.
>
> 1. An increase in surface water runoff discharging into a wetland;
> 2. A change in the normal seasonal flow patterns in the wetland;
> 3. An alteration of the water table in the wetland;
> 4. An increase in erosion resulting in increased sedimentation in the wetland;
> 5. A change in the natural chemistry of the ground or surface water in the wetland;
> 6. A loss of wetland habitat;
> 7. A reduction in wetland habitat diversity;
> 8. A change in wetlands species composition; or
> 9. A significant disturbance of areas used by indigneous and migratory wildlife for breeding, nesting, or feeding.

These criteria are more comprehensive and therefore more stringent than comparable 404 criteria. Also the Commission's criteria are often the basis for outright rejection whereas the COE is likely to weigh all factors and reach a compromise with a conditional permit.

The Pinelands Commission's Land Acquisition Program represents an important means for protection. Since the Pinelands Plan was adopted, between 18,000 and 19,000 Pinelands acres have been purchased under the program, including the 13,000-acre Cedar Creek Watershed area, which is

roughly 20 to 25 percent wetland. The policy of the Commission is to purchase property containing a mix of wetland and upland forest. Currently, funding is available for about 41,000 acres which will be acquired in the near future. These acquisitions include the 2,170-acre Friendship Bog (30 to 50 percent wetland), the 7,300-acre Oswego River extension (about 30 percent wetland), and the 900-acre Goose Pond (about 80 percent water and wetland). A total of 100,000 acres are slated for future purchase.

During the two-year moratorium period when the Pinelands Plan was being developed, building restrictions were more stringent than they have been since the Plan's adoption. During this period there were 17,000 denials and 11,300 approvals for residential housing units, and since then (as of June 1982) there have been twice as many approvals as denials (10,655 vs. 5,105) (Donohue, personal communication). At present because of high interest rates, many more units are approved than are actually being built, and few of these affect wetlands. In the future, however, the Pinelands may be subject to much greater development pressures than they are now.

For Plan implementation, a major goal of the Commission is to shift responsibility for project review to local municipalities or counties. However, in order for this to be accomplished, municipal plans must be certified by the Commission as containing local wetlands protection provisions that are equal to or stronger than the Commission's. Presently, most municipalities have complied and have assumed project review responsibilities. However, there are important exceptions: Atlantic County, Galloway, Egg Harbor Townships (both are located near Atlantic County) and Buena Vista Township. According to the Plan, municipalities in the Protection Area without certified plans as of May 1982 are not authorized to approve projects

before Commission review. This issue is now in court. Nevertheless, most developers with projects in the three municipalities are not proceeding with projects without first applying to the Commission. For the other municipalities, it is too early to tell whether the return of project review to the municipalities has had any effect on wetlands.

Since there are a number of outside government agencies whose regulation jurisdiction applies to Pinelands areas, the Pinelands Plan attempts to provide for their coordination so that they will reflect the policies of the Plan. For example, commercial forestry requires both Commission and DEP review. The Management Plan includes guidelines for wetland protection. DEP reviews the commercial application to ensure that proper silviculture practices are employed. Of Federal programs affecting Pinelands wetlands, Section 404 administered by the Philadelphia Corps of Engineers covers only filling activities in wetlands associated with streams having flows less than 5 cfs. However, it is estimated that 70 to 80 percent of Pinelands wetlands are associated with flows less than 5 cfs and therefore qualify for a Nationwide General Permit. The Corps of Engineers therefore concentrates its efforts on the lower reaches of two of the Pinelands largest rivers, the Mullica and Great Egg Harbor. However, even in these areas, the Corps of Engineers concedes that the Commission performs a more forceful regulatory role, at least within the freshwater jurisdictional area, and there is little if any interaction between the Commission and either the Corps of Engineers or the U.S. Fish and Wildlife Service.

On the State level, the Coastal Management Program, specifically CAFRA, has the most overlap with the Pinelands Plan. Areas of overlap

occur both between Pinelands National Reserve and Coastal Zone, and between Pinelands Protection Area and Coastal Zone (in the lower Mullica watershed). The State has amended CAFRA so that it is consistent with the Pinelands Plan and jurisdictional overlaps do not occur. The 300-foot buffer zone in which development is excluded is added to CAFRA by amendment, but exceptions are somewhat easier to obtain through CAFRA than through the Pinelands Commission (see page 3-50 for specific criteria). Previously, there was no provision in CAFRA for a buffer and developments could extend up to the wetland boundary. However, in the event that the Coastal Management Program's standards are stricter, then they are used. Another State program, the Wild and Scenic Rivers System, includes one Pinelands river: the middle segment of the Mullica which has been designated "wild." The upper two-thirds of Cedar Creek, along with its tributaries is currently being considered for the program; portions may be designated "wild" and others "scenic." A number of other streams are also being considered. The Wild and Scenic designation does not ensure wetland protection; however, it is unlikely that wetlands in designated areas would be filled for nonwater-dependent uses because of the combined effect of the Act and the Pinelands Plan.

According to the Pinelands Commission, most people wanting to undertake activities in the Pinelands are aware that they must apply to the Commission (Harrison, personal communication). However, violations, both of permit conditions and non-permit (failure to obtain a permit), do take place. The Commission estimates them at roughly one per week, about evenly divided between wetlands and uplands. Forestry operations (wood cutting for firewood, etc.) account for the majority of illegal activities, but few if any of these have included draining and filling of wetlands (Zampella,

personal communication). Typical forestry operations in the Pinelands area are covered by the 404 exemption for normal silvicultural practices; therefore, no permits have ever been issued for harvesting timber per se (Denmark, personal communication). Other problems include activities for which a permit has been issued but the conditions are not being met, either because the conditions inconvenience the applicant, or because some areas (e.g., pitch-pine lowlands) are not recognized as wetlands.

The Pinelands Commission has been criticized for not following through on enforcing its restrictions. An example is the case of the conditional permit issued in 1980 to a sand and gravel mining company; the company allegedly has since violated several permit conditions and possibly caused adverse impacts at its 700-acre gravel pit in Barnegat Township. The Pinelands Commission had known about it, but apparently had not been able to do anything about it (Donohue, personal communicant.)

Like many regulatory agencies, the Pinelands Commission has a shortage of manpower for tracking down violators. Most illegal activities are reported by private individuals, and occasionally by the State Fish and Game Commission. The Pinelands Commission is currently trying to make arrangements with the Bureau of Forest Management for better surveillance coverage, and they would also like to coordinate surveillance responsibilities with other State and Federal agencies (Zampella, personal communication).

When violations are discovered, if the Commission cannot persuade the violator to carry out restoration measures, then their only recourse is to report the case to the Deputy Attorney General; the Commission does not have the authority to impose fines. So far, the only cases that have been prosecuted involve individuals who have proceeded without a permit; however serious cases of this have been extremely rare.

Atlantic City

Nearly all wetlands in the Corps of Engineers Atlantic City study area are affected by three levels of regulation: federal, state and local. Since most wetlands within the study boundaries are tidal, nearly all projects require a Section 10 permit from the 1899 Rivers and Harbors Act as well as a Section 404 permit. Section 10 began to be used for wetlands protection in 1970. Section 404 has been in effect since 1975 for Phase I waters, 1976 for Phase II and 1977 for Phase III.

State wetland regulatory efforts began in 1970 with the Wetlands Act which was followed in 1973 by CAFRA. Initially nearly all of the area east of the Garden State Parkway within the drainage of the Brigantine National Wildlife Refuge was designated as a low growth area by CAFRA. However, pressures to provide residential and commercial property began to increase in the mid seventies and reached a peak in 1980 after the Casino referendum was approved. CAFRA therefore reversed its "low growth" designation for that area and approved three large Planned Unit Developments (PUD's) totaling more than 10,000 units.

Once the Casino referendum was approved, the State adopted policies designed to attract casinos and concentrate them along the Atlantic City Boardwalk and the Absecon Inlet. In at least two instances, this policy affected wetlands. In the first, State approvals were obtained by one casino to fill wetlands in Absecon Inlet (Federal approval also was obtained, but only after a long internal struggle among Federal agencies which was finally resolved in an out of court settlement between environmental groups and the Corps of Engineers). The settlement included several conditions among which

was a provision that the casino restore approximately one acre of tidal salt marsh in a Canyon located on the project site in exchange for the filling of an entire lagoon, an area of approximately 8/10 of an acre. In the second, another proposed casino complex along Absecon Inlet involving between 1 and 2 acres of shallow water habitat and wetlands was looked upon favorably by CAFRA, but not by the Corps of Engineers. Ultimately, the applicants modified their plans so as to limit construction landward of the mean high water line. In general, the Corps of Engineers seems to have remained consistent in the Altantic City area with its wetland policies while the State has been more flexible when confronted with conflicting State mandates.

The effect of county and municipal regulatory activities on wetlands are difficult to assess, but evidently are important under some circumstances. In eastern Atlantic County, there are a number of residential projects which are too small to require a CAFRA permit (less than 25 units) and which are located in wetlands which qualify for a Nationwide General Permit (less than 5 cfs). Local Zoning Boards require soils maps for such projects and when developers propose to fill wetland soils, projects plans are often turned down. In some instances, denials are based on environmental considerations while in others the environment may not be the only consideration; many townships believe that they would be better off with large PUD's rather than scattered residential development. In these townships, wetlands on PUD sites are protected under CAFRA although water quality and their value as a natural habitat would be reduced due to stormwater runoff and human encroachment. One such municipality is Galloway Township whose Zoning Board has publicly stated that large PUD's are preferred because they result

in higher tax revenues and because the development of community facilities and services are part of the "package". Regardless, most municipalities including Galloway either have their own wetlands maps or access to such maps and many provide a degree of protection by zoning wetlands for "conservation".

To a limited extent, Atlantic County controls development in wetland areas. This has been done through the Health Department (for on-site septic systems) and in at least one instance through the County Sewerage Authority which mapped wetlands under the 208 Program. The Authority has obtained Federal funding and State approval to extend a sewer line through an area with a high proportion of wetlands. A written condition of the Pleasantville-Mays Landing Sewerline Extension is that sewerage hookups will not be permitted from any new facilities which would be located in wetlands areas. According to a member of the County Planning Staff, this condition evolved as a result of an earlier decision by the U.S. EPA not to fund sewage extensions below the 10-foot contour line in Cape May. Salt- and freshwater wetlands are widespread below this elevation throughout the County.

From the above, one might surmise that in the Atlantic County region levels of government have different attitudes and objectives concerning development and therefore each has its own set of policies concerning wetlands. Some policies are conflicting. It is interesting to note however that, at least for the present, only minimal saltwater acreage is being lost to development. Losses in freshwater wetlands are much less clear cut; freshwater wetland-acreage is threatened, probably not so much by large projects which require State and Federal approval, but by countless small projects located in areas covered by Nationwide General Permits and which fall below the minimal requirements for CAFRA review. In some instances,

local regulations and/or attitudes are sufficient to protect wetlands, but in others they are not.

It is important to point out that the real or implied force of State and Federal regulations has been adequate to keep the large PUD's from building in the wetlands and therefore they have protected the quantity of wetlands, the future quality of wetlands, however, is much less certain. CAFRA's decision to permit high density development adjacent to the Brigantine National Wildlife Refuge and within the drainage of New Jersey's most pristine estuary has been controversial and has resulted in at least one lawsuit so far. In defense of its decision, CAFRA points out that an elaborate water quality monitoring program is included as a condition to the permit; however, there has been considerable difficulty in getting the program underway (problems are related to specific parameters to be sampled, frequency and location of stations). Also, the State has neither established limits as to what will be considered "intolerable" in terms of pollution loading nor formulated guidelines for their response in the event that development does impact water quality significantly.

The threat of Federal intervention evidently was sufficient to warrant at least one major developer to spend a large sum for mapping freshwater wetland boundaries and formulating a plan that kept development out of the wetlands. A spokesman for Historic Smithville (6,800 units) claimed that his firm had spent $200,000 for this purpose in order to avoid involvement with the U.S. Fish and Wildlife Service. There has been no reason for the Corps of Engineers to take jurisdiction, at least to date, so neither the U.S.Fish & Wildlife Service nor other federal agencies have had much direct input.

The developer worked closely with Corps of Engineers biologists to determine wetland boundaries.

In summary, wetlands in the Atlantic City region are benefiting from Federal, State and local regulations as indicated by the general lack of activity in them. There is widespread public support for the protection of saltwater wetlands, but probably much less public concern for freshwater areas. Nevertheless, there is relatively little development in freshwater wetlands at the present time. However, the lack of pressure for such development should be evaluated in light of current economic conditions. High interest rates have stymied developers in the last two years, and therefore it is difficult to separate out the effects of regulation in freshwater areas from the effect of the economy. In all probability, these wetlands would be under much more pressure if economic conditions were better.

Chapter 4

SUITABILITY OF INSTITUTIONAL MECHANISMS IN PROTECTING WETLANDS

This chapter first summarizes the collective impact of all programs on wetlands. Further discussions focus on the effectiveness of individual programs, the extent of program overlaps and the gaps in programs.

With regard to wetland quantities, the amount of wetland losses has reduced significantly since the inception of wetland programs in the last 10 years. On a statewide basis, the saltwater wetland losses averaged approximately 3,200 acres per year between 1953 and 1973, and losses per year since then have reduced to approximately 50 acres per year. In the Pinelands area, losses have been drastically reduced since 1980 although precise numbers are not available. In the Hackensack Meadowlands, the losses have reduced from out 175 acres per year between 1950 and 1970 to between 50 to 120 acres depending upon whose figures are used. Further expected losses at the rate of 120 acres per year will occur if the Meadowlands Master Zoning Plan is implemented as is.

With regard to surface water quality in New Jersey's waterways and associated wetlands, it appears that conflicting forces are at work. Other Clean Water Act programs such as the effluent limitations guidelines and sewage treatment construction grants programs have helped improve water quality in coastal and inland water areas and have helped to reopen shellfishing areas and attract more fish and wildlife species. On the other hand, in some waterways such as the Delaware Estuary, increased sediment and associated contaminants from erosion and stormwater runoff have in various unquan-

tified ways may have partially nullified gains by improved wastewater treatment. There are no data to indicate the efect of wetlands per se on water quality.

The regulatory programs that most significantly affect the wetlands of New Jersey are:

Section 404 of the Federal Clean Water Act (1972)
New Jersey Wetlands Act (1970)
Coastal Areas Facility Review Act (CAFRA) (1972)
Flood Hazards Area Control Act (1972)
Pinelands Commission (1979)
Hackensack Meadowlands Development Commission (HMDC) (1968)

The 404 program protects all kinds of wetlands throughout the State as long as they are above the 5 cfs limitation. This broad coverage of wetlands has been a very important tool available to environmental groups trying to protect major wetlands since the program is often the only one available. Where State programs exist, the presence of the 404 program provides important back-up; developers are more reluctant to fight first the State and then the Federal programs and, in special cases where, for technical reasons, the State reluctantly has to approve a project, it can do so knowing that the Federal program will deny the project.

Another contribution of the 404 program is that it applies essentially uniform policies throughout the State for protection of wetlands. There are not sharp regional, watershed, or local differences in wetlands policies. There is only one policy which receives different interpretations by the New York and Philadelphia Corps districts: the New York Corps is more restrictive than the Philadelphia Corps regarding the definintion of "adjacent" wetlands.

However, in New Jersey, the 5 cfs limitation is very significant and means that a large percentage of freshwater wetlands in the State are outside the jurisdiction of the 404 program. In addition to the 5 cfs limitation and the differences in interpretations of jurisdictions, the lack of a way for 404 to deal with cumulative impacts was frequently discussed during the interviews for this study. It is a problem for the program as a whole but particularly where Nationwide Permits are concerned. Other problems discussed were the almost total lack of surveillance of especially inland freshwater wetlands, the lack of a flow of information about illegal fills among various Federal agencies, and minimal or no follow-up on compensation or mitigation plans incorporated into permits.

If there was no 404 program, most tidal wetlands would be fully covered under the New Jersey Wetlands Act. Inland wetlands within the Pinelands would be protected as well as other specific areas set aside as bird sanctuaries, etc. And inland wetlands within the CAFRA area would be protected but only from major developments (over 25 housing units or 300 parking spaces). Essentially no other inland wetlands would be protected except as a secondary result of floodplain permits.

The New Jersey Wetlands Act protects wetlands influenced by tides (both saline and freshwater wetlands) except those near New York City and in the Newark Bay. It covers all draining, excavation, or construction activities, but the types and extent of wetlands are strictly limited in the law to those areas which support designated species of wetland vegetation. In addition, its jurisdiction is limited to where those species were mapped in 1972; no newly created wetlands are covered. The Wetland Act program is

also less generous than the 404 program in interpreting what a "preponderance of wetland vegetation" means.

The most obvious gap in the coverage of the State's Wetland Act is that no inland freshwater wetlands are covered. If the program were eliminated, all of its wetlands would be covered by the CAFRA program and by 404.

The CAFRA (Coastal Areas Facility Review Act) program covers wetlands of all types, size flows, and acreages, however, it is geographically limited to the New Jersey shore area and certain related inland areas. It is also limited in that it can only take jurisdiction where there are "major" developments (housing developments of more than 25 units, commercial and industrial development of more than 300 parking spaces, and extensions of municipal services by more than 1,200 feet). The overall CAFRA program is also structured around regional planning objectives incorporating a wide range of regional, state, and national policies and issues. Therefore, although wetlands are classified as "Special Areas" to receive the greatest protection, it is possible that even they are vulnerable to pressures including those represented by shifts in public administrations. The policies governing wetlands also contain such language as where there is "no feasible alternative," language which is especially susceptible to interpretation and pressure from developers and their lawyers.

If this program were eliminated, tidal wetlands would continue to be protected by the States' Wetlands Act as well as by 404. The 404 program would be the only institution to protect the inland wetlands presently under CAFRA, except for a small area which is also under the jurisdiction of the Pinelands Commission.

The New Jersey Flood Hazards Control Act program deals with areas often containing wetlands, but their protection is not part of the law or the program's policies. Threfore it is only by the nature of specific circumstances and permits that wetlands involved are protected. However, even if the program were to specifically protect wetlands, the protection would be restricted to wetlands within a calculated 100-foot floodplain. Many wetlands extend well beyond it; these would not be protected. In addition, the program does not consider small watersheds and their wetlands, nor the cumulative impact of permitted activities within the floodplain.

In the absence of this program, there is the 404 program (with its 5 cfs limitation, and minimal surveillance of inland wetlands) and the geographically limited CAFRA, Pinelands, and Hackensack Meadowlands programs.

The Pinelands Commisison protects all wetlands under its geographical jursidiction and covers all activities. Since its principal shortcoming is a lack of thorough follow-though on permit conditions, it is currently trying to improve monitoring and surveillance by establishing communication channels with other State and Federal agencies.

In the absence of this program, 404 technically would protect the area's wetlands. However the 5 cfs limit of jurisdiction would effectively reduce 404's oversight of more than 70 percent of the wetlands in the Pinelands. There is a small area where the CAFRA prgram policies would apply. However there is more flexibility in interpreting policies under the CAFRA program. For example, the 300 foot buffer around a wetland which is required by the Pineland's Commssion is a flexible target for CAFRA.

The Hackensack Meadowlands Development Commission's concern for wetlands is embedded in its legal mandate to protect the delicate balance of

nature. However the Commission is also mandated to provide jobs, homes, and extensive solid waste disposal facilities. So, although it has jurisdiction over all activities in all its wetlands, there is a significant development context for its decisions. Recent decisions which would adversely affect wetlands are being controlled by the 404 program. The 404 program would be the principal wetlands protection program left if the HMDC program were eliminated.

The role local government plays in wetland protection varies from one municipal boundary to another and therefore could not be evaluated thoroughly in this study.

All of the above state and federal programs use permits as the basic implementation mechanism. All require detailed plans. All of the State programs, i.e., CAFRA, Wetlands Act and Waterfront Development Act are administered through a single division in the N.J. DEP to avoid inconsistencies, a single application is being prepared for all three of these programs. Multiple applications are required, however, between CAFRA and the Corps of Engineers, between the Pinelands Commission and the Corps of Engineers, between the Pinelands Commission and CAFRA, and between the HMDC and the Corps of Engineers. There is no duplication in permits between the HMDC and the N.J. DEP because HMDC has overall authority in the area. The DRBC program is minimal and is coordinated with the N.J. DEP and the Corps of Engineers.

None of the State or Federal programs has any way to deal with the long-range cumulative impacts of their permit programs.

Surveillance and inspection of all wetlands appears to be from minimal to moderate, although there are some referrals between the State and Federal

programs. All of the agencies count on tips from the public. Coastal and tidal wetlands receive more of the surveillance than inland wetlands.

The lack of New Jersey administrative judges and New Jersey state laws protecting most inland wetlands has proved a stumbling block for the expeditious handling of State as well as Federal cases. Action is also slow when a State or Federal Attorney General is involved.

It is very difficult to determine what the net effectiveness of the State program would be if the State had total wetlands authority. The CAFRA and Pinelands Commission programs are at least as stringent as the 404 program. However, the CAFRA program has never been administered without the presence of the 404 program. Those involved in the CAFRA program are concerned that, since 1981, the public interest clause, rather than the environmental clauses, of the enabling legislation has been increasingly used as a factor in issuing permits. A similar cause for concern is the fact that the new governor of New Jersey has just appointed two new members to the Pinelands Commission to replace the two most vocal environmentalists. It is thus unclear whether CAFRA and the Pinelands Commssion will be able to withstand the pressures to moderate the environmental component of permit decisions.

Chapter 5

RECOMMENDATIONS

The following is a list and brief discussion of recommendations regarding the protection of wetlands and the administration of institutional wetlands programs. The list reflects a combination of recommendations made by people contacted during the study and by the authors of the report.

- Wetland definitions need to be consistent among the Federal program for jurisdictional purposes, field mapping purposes, and for aerial mapping purposes. Training with respect to such definitions should be updated for long-time Federal employees working in wetlands programs who were taught different definitions.

- Regarding wetlands mapping, the distribution of wetland maps at the local levels would facilitate local municipality sensitivity to wetlands protection objectives and institutional programs. If properly marked, the maps would also settle Corps of Engineers jurisdictional questions in advance.

- Both Corps of Engineers Districts recommend public education programs aimed at developers, local municipal representatives and interested citizenry. Emphasis in the education would be placed on the importance of wetlands (particularly freshwater), the identification of wetlands, the pertinent laws and the monitoring and reporting of potentially illegal activity.

- Wetland surveillance should te conducted more extensively, for at least a short period, to determine the extent of illegals so that a reliable surveillance program can be achieved. Overall improved surveillance would occur if the various state and federal programs were better coordinated. Greater surveillance would also reveal the effectiveness of and compliance with mitigation plans.

- Legislative changes should be considered that would give the Corps of Engineers more enforcement power, such as, citation power and administrative law judges.

- A separate study should be performed on the effectiveness of mitigation in order to give it the proper usage in permitting practices. The effectiveness of and compliance with mitigation/compensation seems uncertain enough to warrant greater understanding of its role in permits.

- Improved guidance should be given to Corps of Engineers permit writers for dealing with cumulative environmental impacts.

- Initial Corps review of permit applications should include soils, vegetation, average depth of the water table, historical (i.e., 10-15 year) flood heights, surface characteristics of the site indicating the presence of water (massive roots exposed, serious gulleys), and the characteristics of immediately neighboring sites especially when the project sites soil has been altered or removed.

- The protection of wetlands should be tied by law not only to water quality but also to flood protection and water storage and other major values of wetlands. This would allow much stronger and more effective cases for the protection of wetlands by both programs and environmental groups.

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